

AI AUTOMOTIVE INDUSTRIES

AUTOMOTIVE and AVIATION MANUFACTURING

Civilian and Defense

SEPTEMBER 15, 1951

In This Issue . . .

Transport—Russia's Achilles' Heel?

Aircooled Engines That Start at -45 F

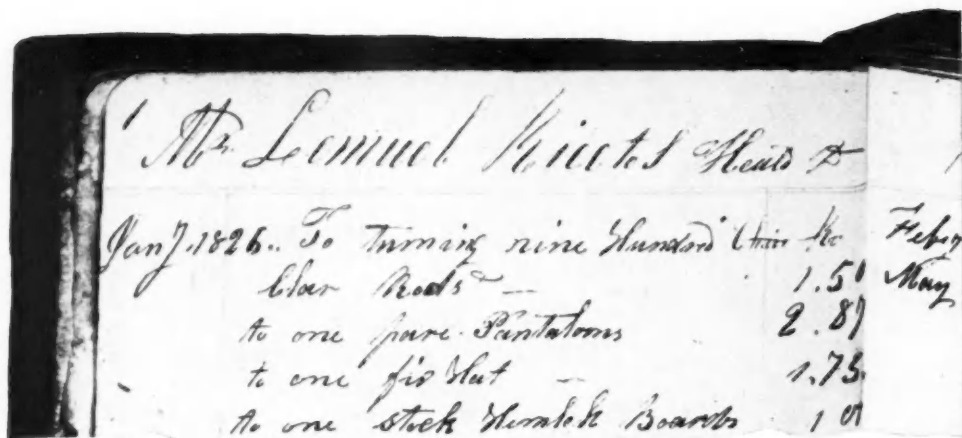
Ford Introduces Luxury Model in France

Small Gas Turbine Developed for Navy

24,000 Hp Jet Engine Dynamometer

Complete Table of Contents, Page 3

A C H I L T O N P U B L I C A T I O N



YESTERDAY

Mr. Lemuel Rice to S. Heald Dr.

January 7, 1826

To turning nine hundred chair rods

1.50

This first entry, 125 years ago, in Stephen Heald's ledger marks the beginning of the business of The Heald Machine Company. Farmers for miles around depended on this man's skill and ingenuity for their ox yokes, plow beams and farming tools. He repaired their sleighs, sawed their shingles and ground their grain. He was to be followed by his son, his grandson, and his great grandsons.

Cheese presses, stoves, steam engines—sash trimmers, twist drill grinders and tool post attachments—the products changed through the years but serving the needs of the community continued.

Soon after 1900 the precision-production requirements of the automobile industry were foreseen. The Piston Ring Grinder, Cylinder Grinder and the Internal Grinder have become known the world over as distinctively "Heald." Later noteworthy developments included hydraulic table drives, automatic size control and the Bore-Matic line of precision finishing machines.



TODAY

Commerce, transportation, communication—food, clothing and shelter—all that pertains to our modern way of living depends on machine tools. They have made possible mass production and higher standards of living. Today Heald offers its best in machines and service.

TOMORROW

The record of Tomorrow awaits the future. Our Company is proud to be 125 years old. However, we know what really counts is what we will do with our background for Tomorrow. This is the beginning—not the end—of our greatest opportunity. With a deep sense of responsibility and an earnest desire to be found worthy, we face forward with confidence towards Tomorrow.

THE HEALD MACHINE COMPANY
WORCESTER 6, MASSACHUSETTS



You can believe in **THIS SIGN**

...it identifies your Waukesha Distributor

How well . . . and how long . . . Waukesha Engines and Power Units perform for the user of a truck, tractor, air compressor, shovel, oil rig, or any other power machinery . . . is of prime importance to the Waukesha Motor Company . . .

And the link between the two—the Waukesha Distributor, is of equal importance.

For your convenience the Waukesha Distributor in your locality has a full stock of Waukesha engineered parts. And an assortment of complete Waukesha Power Units for quick delivery . . .

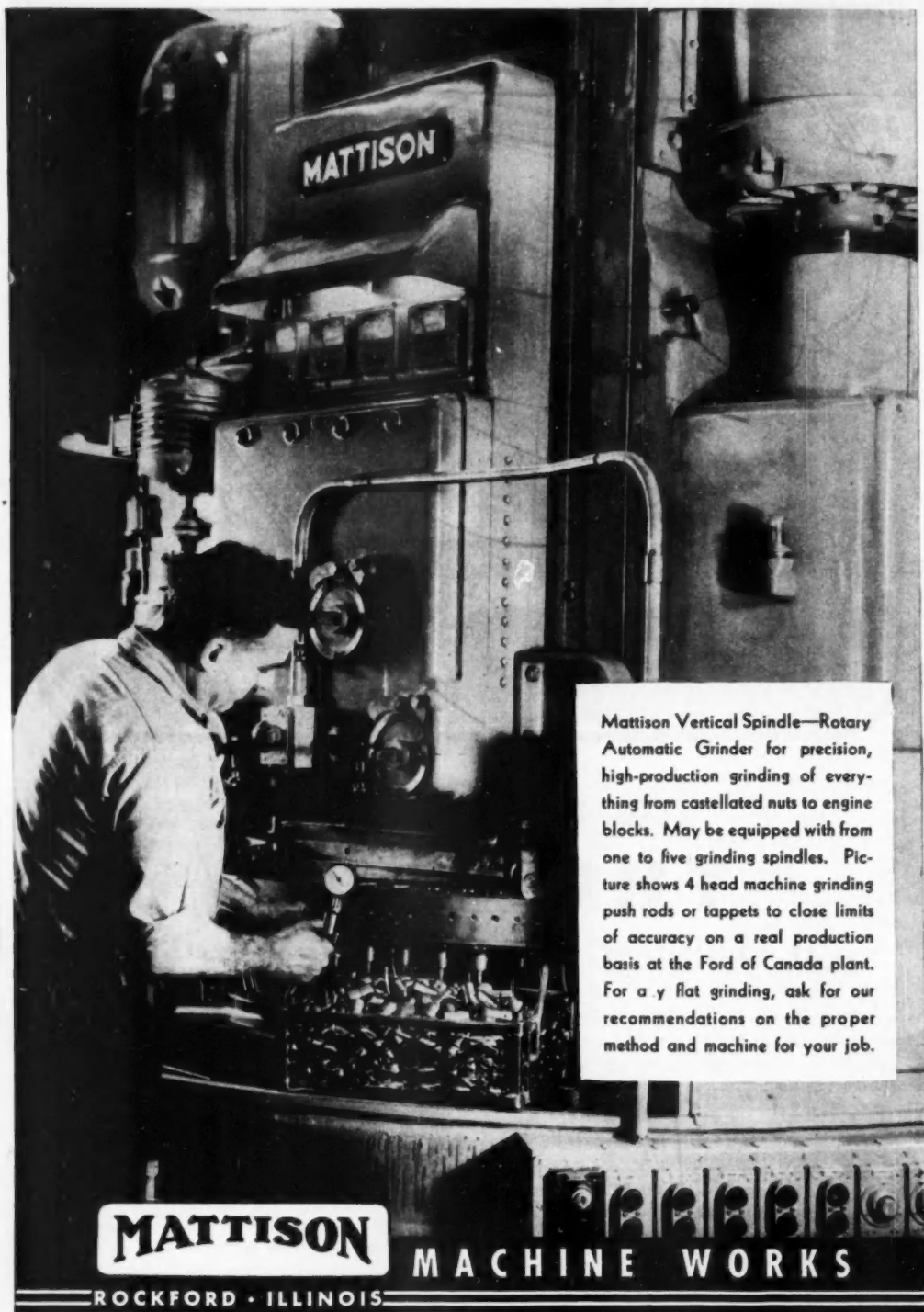
Experienced mechanics, too—ready to give your Waukesha Engines periodic inspection and tune-up . . .

or to rebuild your equipment when needed. Trained engine-specialists perform every service operation by factory-approved methods, and to Waukesha precision standards. The mechanical staff will be glad to give you practical technical advice on any phase of the use and care of Waukesha power plants.

Your Waukesha Distributor is a part of a select, nationwide organization of engineers and service men of specialized experience and the highest reputation. He's a good man to know . . . and you'll like him, too. Look for the sign—stop in and see him.

146

WAUKESHA MOTOR COMPANY, WAUKESHA, WIS.
NEW YORK • TULSA • LOS ANGELES



MATTISON

Mattison Vertical Spindle—Rotary Automatic Grinder for precision, high-production grinding of everything from castellated nuts to engine blocks. May be equipped with from one to five grinding spindles. Picture shows 4 head machine grinding push rods or tappets to close limits of accuracy on a real production basis at the Ford of Canada plant. For a y flat grinding, ask for our recommendations on the proper method and machine for your job.

MATTISON MACHINE WORKS
ROCKFORD • ILLINOIS

AUTOMOTIVE INDUSTRIES

Published Semi-Monthly

September 15, 1951

Vol. 105, No. 6

Contents

High Spots of This Issue	15
News of the Automotive Industries	17
Men in the News	25
New Aircooled Engines Feature Starting at -65F	32
SAE West Coast Meeting	33
Small Gas Turbine That May Be Started by Hand. By A. D. Zakarian and Roy R. Peterson	34
24,000 Hp. Dynamometer for Testing Turbo-Jet Engine	36
Ford Adds Luxury Model to Line in France. By W. F. Bradley	37
Transport . . . Russia's Achilles' Heel? By Holland Hunter	39
Industrial Truck System at Bendix Aviation Plant	44
Britain's Nationalized Transport Operated at Huge Loss and Leaves Trail of Widespread Discontent. By W. F. Bradley	45
Vauxhall Announces New Cars for 1952. By W. F. Bradley	46
Fluid Hydroformer Converts 55 Octane Naphtha to 98-175	47
The Business Pulse	48
New Production and Plant Equipment	50
News of the Machinery Industry	50
Publications Available	56
Airbriefs. By Robert McLaren	58
New Products	63
New Products for Aircraft	120
Observations. By Joseph Geschelin	124
Calendar of Coming Shows and Meetings	132
New Defense Facilities	150
Advertisers' Index	200

Copyright 1951 by Chilton Company (Inc.)

One of the Publications Owned by

① CHILTON COMPANY (INC.) ①

Executive Offices

Chestnut and 56th Streets, Philadelphia 39, Pa., U. S. A.

Officers and Directors

Jos. S. HILDRETH, President

Vice-Presidents

EVERIT B. TERHUNE

G. C. BUZZY

WILLIAM H. VALLAR, Treasurer

MAURICE E. COX

L. V. ROWLANDS

FRANK P. TIGHE

GEORGE MAIRWINKLE, Asst. Treas.

P. M. FAHRENDORF

HARRY V. DUFFY

JOHN BLAIR MOFFETT, Secretary

GEORGE T. HOOK

TOM C. CAMPBELL

Member: Audit Bureau of Circulations

AUTOMOTIVE INDUSTRIES is a consolidation of The Automobile (weekly) and the Motor Review (weekly), Mar. 1902; Dealer and Repairman (monthly), October, 1903; the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, Mar. 1918.

AUTOMOTIVE INDUSTRIES, Vol. 105, No. 6. Published semi-monthly by Chilton Co., Chestnut & 56th Sts., Phila. 39. Entered as Second Class Matter October 1, 1925, at the Post Office at Philadelphia, Pa.; Under the Act of Congress of March 3, 1879. In case of Non-Delivery Return Postage Guaranteed. Subscription price: United States, Mexico, United States Possessions, and all Latin-American countries, 1 year \$2.00, 3 years \$5.00. Canadian and Foreign \$5.00 per year; single copies, 25 cents, except Statistical Issue (Mar. 1950), \$1.00.

AUTOMOTIVE INDUSTRIES, September 15, 1951

TOUREK

BALL JOINTS • PIPE PLUGS

AND

QUALITY SCREW MACHINE PRODUCTS



BALL JOINTS

The use of Tourek Ball Joints—the only recognized standard—frequently brings about simplified design, improved performance and lower costs. A wide range of standard types is carried in stock to assure prompt delivery.



PIPE PLUGS

Accuracy, high strength and economy are yours by specifying Tourek precision countersunk pipe plugs. You get these advantages at costs which are competitive to old style plugs.

Stock sizes, available with National Pipe or Dry-Seal threads are: 1/4", 3/8", 1/2", 3/4" and 1". Also available on special order in alloy steels, aluminum or brass in sizes up to 2 1/2" diameter.



SCREW MACHINE PRODUCTS

The Tourek plant is one of the largest and most modern in this field. It is equipped with the latest in high speed single and 6-spindle automatics, as well as complete secondary equipment including grinding and brazing. These production facilities—backed by 30 years' experience, assure you "The Best In Quality Screw Machine Products".

Depend upon Tourek for your screw machine product needs, in sizes up to 2 1/2".

LITERATURE. Comprehensive data on any or all Tourek products sent promptly upon request . . . write for yours now. J. J. TOUREK MFG. CO., 4701 W. 16th St., Chicago 30, Illinois



TOUREK

"THE BEST IN QUALITY SCREW MACHINE PRODUCTS"



ESTABLISHED IN 1920

More **BALED Scrap**

**Means More Iron and
Steel for You...NOW and
in the Future !**



**GALLAND-HENNING
MANUFACTURING CO.**

2747 S. 31st ST., MILWAUKEE 46, WIS.

How much sheet metal scrap is your plant generating? *How fast* is it finding its way back to the mills, furnaces and foundries in the form of dense, compact bales for the production of new steel and iron? If you are baling your sheet metal scrap . . . and salvaging your heavy scrap . . . you are helping iron and steel production keep pace with defense and civilian requirements. Keep your scrap baling equipment operating at top capacity . . . and *plan now* to expand and modernize your baling operations to meet future needs.

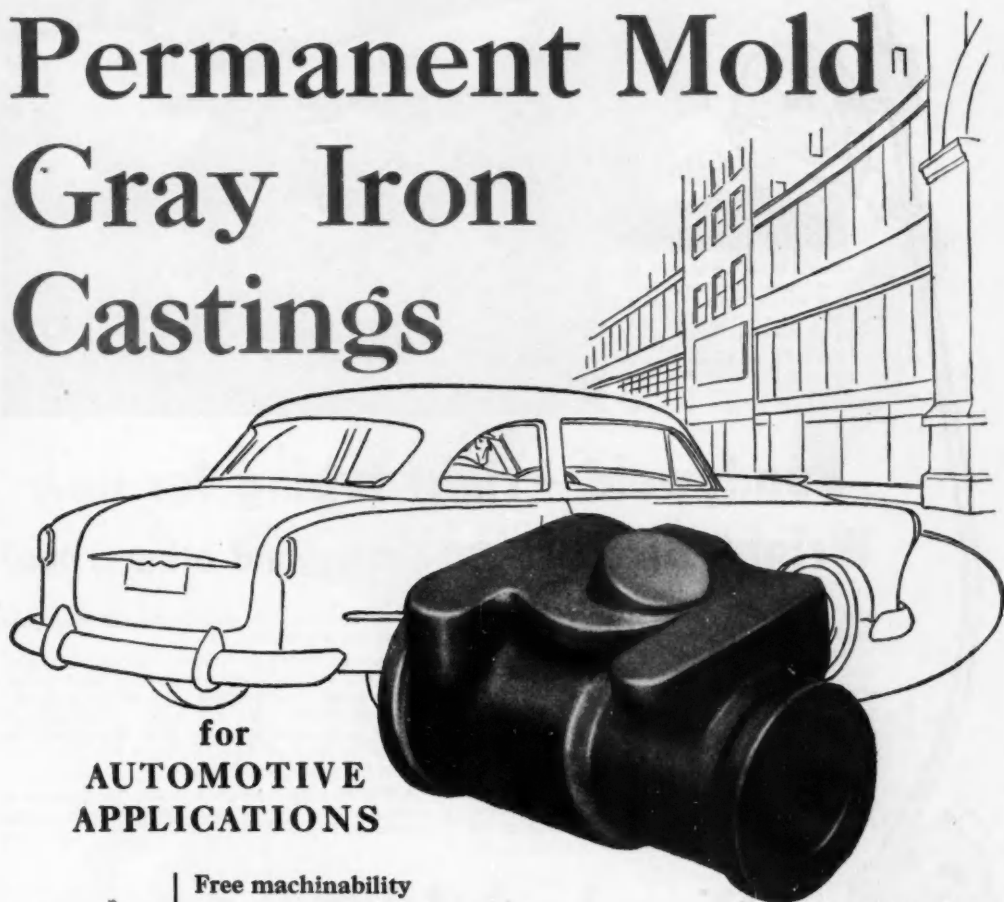
Galland-Henning offers you competent counsel on your baling problems, based on years of experience in the design, construction and installation of powerful, hydraulic scrap metal balers for steel mills, industrial plants and scrap yards.

GALLAND-HENNING

SCRAP METAL BALING PRESSES

A 5975-1P

Eaton Permanent Mold Gray Iron Castings



for
**AUTOMOTIVE
APPLICATIONS**

Free machinability
Dense, non-porous structure
Uniform structure throughout the casting
Freedom from leakage under pressure
Machines to high, mirror-like finish
Properly annealed; no growth or distortion after machining

Send for your copy of the illustrated booklet, "A Quick Picture of the Eaton Permanent Mold Process for Producing Gray Iron Castings."

EATON MANUFACTURING COMPANY

CLEVELAND, OHIO

FOUNDRY DIVISION: 9771 FRENCH ROAD • DETROIT 13, MICHIGAN

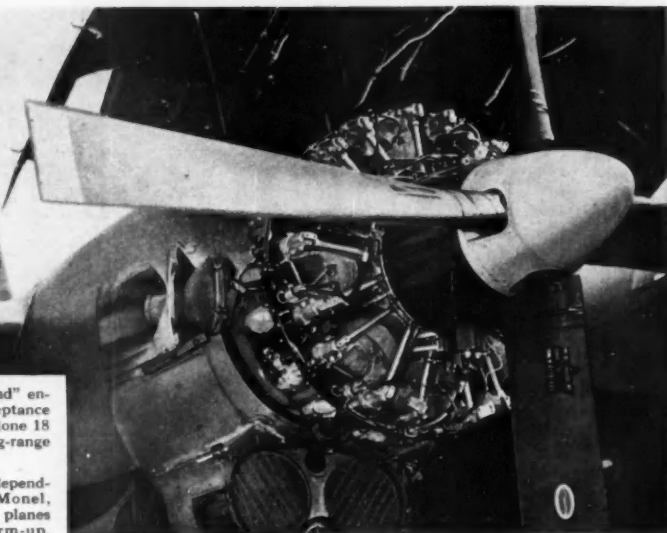


PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings • Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers



FIRST aircraft "compound" engine to pass military acceptance test, Wright Turbo-Cyclone 18 now powers two long-range anti-submarine planes.

← **LEFT:** Primer lines of dependable Bundyweld, in Monel, help many types of planes take off without warm-up.



Bundyweld — right tubing for new Wright aircraft engine (and others, too)

The new 3250 horsepower Wright Turbo-Cyclone engine gets off to a flying start with the help of Bundyweld (Monel) primer lines—just one of many exacting new defense uses in which Bundyweld, the top automotive tubing, also excels.

Bundyweld's advantages in almost any small-diameter tubing application stem from its patented construction. It's double-walled from a single strip of Monel, nickel, or steel—with an exclusive beveled edge. It's copper-brazed through 360° of wall contact. Bundyweld's double walls are thinner walls—lightweight, yet amazingly strong. It em-

bodies exceptional fatigue strength, withstands more pressure, is leakproof, too.

Bundyweld bends easily, takes more bending without structural collapse or weakening. Its close tolerances and freedom from scale assure smoother production, save time and money. And our engineers stand ready to unsnarl your knotty bending problems. We'll produce your parts, too, ready and right for your assembly line.

Whatever your needs, you'll find we bend over backward to answer them. Write: **Bundy Tubing Company, Detroit 14, Michigan.**



Bundyweld Tubing

DOUBLE-WALLED FROM A SINGLE STRIP

WHY BUNDYWELD IS BETTER TUBING



Bundyweld starts as a single strip of basic metal, coated with a bonding metal. Then it's...



continuously rolled twice around laterally into a tube of uniform thickness, and



passed through a furnace. Bonding metal fuses with basic metal, presto—



Bundyweld... double-walled and brazed through 360° of wall contact.



NOTE the exclusive patented Bundyweld beveled edge, which affords a smoother joint, absence of bead and less chance for any leakage.

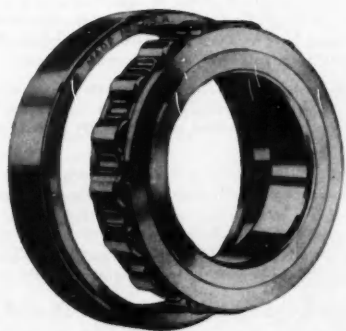
SIZES UP TO 1 1/8" O.D.

Bundy Tubing Distributors and Representatives: Cambridge 42, Mass.: Austin-Hastings Co., Inc., 226 Binney St. • Chattanooga 2, Tenn.: Pelviam-Deakins Co., 823-824 Chattanooga Bank Bldg. • Chicago 32, Ill.: Lopham-Hickey Co., 3333 W. 47th Place • Elizabeth, New Jersey: A. B. Murray Co., Inc., Post Office Box 476 • Philadelphia 3, Penn.: Rufen & Co., 1717 Sansom St. • San Francisco 10, Calif.: Pacific Metals Co., Ltd., 3100 19th St. • Seattle 4, Wash.: Eagle Metals Co., 4755 First Ave. South Toronto 5, Ontario, Canada: Alloy Metal Sales, Ltd., 881 Bay St. • Bundyweld nickel and Monel tubing is sold by distributors of nickel and nickel alloys in principal cities.

*for high speeds
for high temperatures*



HYATT HY-LOADS for jets



During World War II, Hyatt was a leader in the production of roller bearings for aircraft engines.

Long, successful experience in the manufacture of high precision bearings for piston-type aircraft engines enables Hyatt to get into production, quickly, on bearings for the Allison J-33 and J-35 Turbo Jet engines, operating so efficiently in "Shooting Stars," "Thunderjets," "Panthers," and "Scorpions."

Look to Hyatt for high precision roller bearings for critical applications.

Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey and Detroit, Michigan.

HYATT ROLLER BEARINGS

**SOLID STEEL
HEADS, CAPS
and MOUNTINGS
MACHINED from
SOLID BAR
STOCK**

**HARD
CHROME PLATED
PISTON
RODS**

**DIRT
WIPER
SEALS**



**STANDARD LEATHER CUP SEAL ASSEMBLY SHOWN IS
INTERCHANGEABLE WITH STANDARD PISTON RING
PISTON ASSEMBLY**



MILLER *High Pressure* **HYDRAULIC CYLINDERS**

Meet J. I. C. HYDRAULIC STANDARDS

(Write for FREE copy of these "Standards")

Benefits to You
**No Broken Castings
No Scratch-Damage
to Piston Rods,
Bushings and Seals**

**NO COSTLY
"DOWNTIME"
NO REPAIRS
NO MAINTENANCE
NO POWER WASTAGE**

Years before the Joint Industry Conference (J. I. C.) Standards for specifying "quality" hydraulic equipment were adopted, the standard design and construction features of Miller High Pressure Hydraulic (2000-3500 psi) Cylinders already included ALL the specifications for cylinders, seals and pistons now called for by the "Standards". Hard chrome plated, scratch-resistant piston rods and dirt wipers have long been standard Miller cylinder features yet are required by the "Standards" only under severe conditions.

Solid steel heads, caps and mountings which eliminate costly, dangerous breakage even under the severest operating conditions represent an "extra-quality" standard Miller cylinder feature which actually exceeds the high quality set by the J. I. C. Standards.

The Miller "Patented" Hydraulic Piston Rod Seal which has no manual adjustment and is automatically self-adjusting and wear-compensating to give life-long leakproof service without ever requiring any manual adjustment whatsoever . . . far surpasses the requirement of J. I. C. Standard H6.2.5 which specifies "Stuffing boxes for automatic packing shall be so designed as to prevent adjustment beyond the functional limits of the packing"

Write for illustrated cylinder bulletins A-105 and H-104

COMPLETE MILLER CYLINDER LINE INCLUDES: AIR CYLINDERS, 1 1/2" to 20" bores, 200 PSI OPERATION; LOW PRESSURE HYDRAULIC CYLINDERS, 1 1/2" to 6" bores for 500 PSI OPERATION, 8" to 14" bores for 250 PSI; HIGH PRESSURE HYDRAULIC CYLINDERS, 1 1/2" to 12" bores, 2000-3000 PSI OPERATION. ALL MOUNTING STYLES AVAILABLE.



MILLER MOTOR COMPANY

2028 N. HAWTHORNE . . . MELROSE PARK, ILLINOIS

CLEVELAND — PITTSBURGH — PHILADELPHIA — DETROIT — YOUNGSTOWN — BOSTON
HARTFORD — NEW YORK CITY — DAYTON — ST. PAUL — FORT WAYNE — INDIANAPOLIS
MILWAUKEE — NASHVILLE — SEATTLE — LOS ANGELES — SAN FRANCISCO — BALTIMORE
ST. LOUIS and OTHER AREAS.

Sales and Service from coast to coast

WHEN THE JOB IS *Tough*



U Series FWD Tractor and Heavy-Duty Semi-Trailer

ROSS BRINGS EASE . . . AND ECONOMY

Cam & Lever **STEERING**

"ROUGH GOING" in the oil fields places a premium on *maneuverability* as well as rugged construction. The FWD model U delivers admirably in both requirements and it is equipped with *the finest in steering—ROSS.*

The Ross policy of incorporating advancements in design as they are proved by exhaustive tests has resulted in many recent improvements. Current Ross models have:

- (1) *Increased mechanical reduction . . .* (2) *More compactness . . .* (3) *Reduction in weight . . .*
- (4) *Greater arm angular-travel . . .* (5) *Improved metallurgy . . .* (6) *Increased efficiency.*

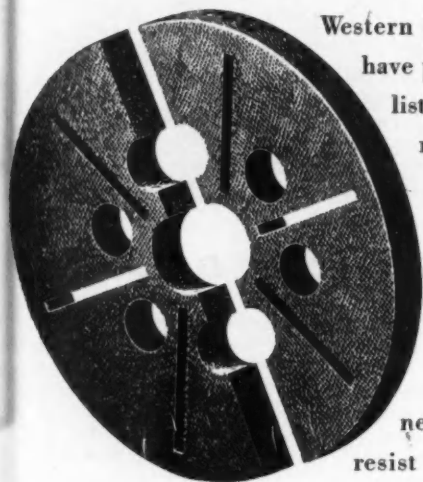
Throughout 44 years of leadership in this industry, Ross gears have been distinguished for long life, simplicity of adjustment and maintenance of long-recognized qualities of safety, stability and performance. We invite discussion of any steering problem.

ROSS GEAR AND TOOL COMPANY • LAFAYETTE, INDIANA

P.V.*

APPROVAL

**Plus
Value*



Western Felt users over a long period of years have placed their stamp of approval on a long list of its products. They know from experience the "plus value" in every Western Felt component part. Highest precision in its processing and cutting produces a uniformity that minimizes rejections — prevents failure of the finished product from felt causes. They are available from wool softness to rock hardness—never lose shape—do not ravel or fray—resist oil, water, age—are resilient, flexible, compressible—may be cut to close tolerances.

Acadia Synthetic Products Division,
WESTERN FELT WORKS, Processors of
Synthetic Rubber — Sheets, Extrusions,
Molded Parts.

WESTERN

4035-4117 Ogden Ave.
Chicago 23, Illinois

Branches in all Principal Cities

Felt



WORKS

MANUFACTURERS AND CUTTERS OF WOOL FELTS

IF YOU



RIVET
PUNCH
FORM
BEND...Investigate

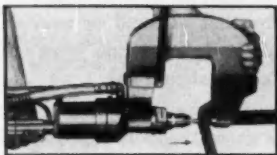
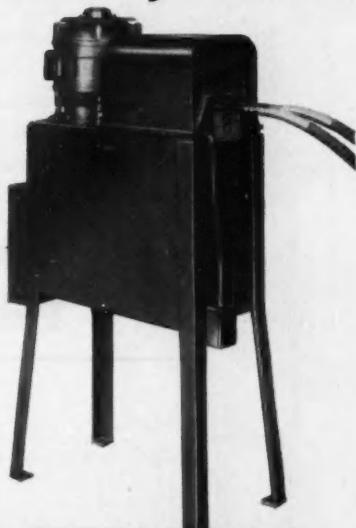
"HY-POWER" Hydraulics

What is "Hy-Power"? The "heart" of the "Hy-Power" hydraulic system is the unique "Hy-Power" Generator—a combination of motor, pump, oil reservoir, control valves and high pressure intensifier assembled as a compact, self-contained unit—an exclusive, highly useful Hannifin development.

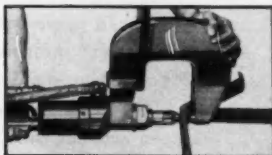
What will it do for you? This "Hy-Power" Generator, operating Hannifin work tools with instantly reversible push-button control, gives you "Hy-Power" Hydraulics; enables you to rivet . . . punch . . . form or bend with forces up to 100 tons (more with multiple cylinders). Everywhere, engineers are turning to this modern hydraulic power source for cost-reducing production.

No doubt you can profit through Hannifin's wide experience with "Hy-Power" Hydraulics and practical recommendations for its use in your plant! Hannifin Corporation, 1143 S. Kilbourn Ave., Chicago 24, Ill.

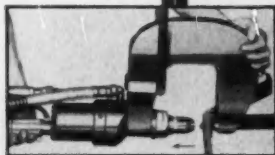
DESIGN ENGINEERS AND TOOLING SPECIALISTS...PUT THIS FINGER-TIP CONTROLLED WORK CYCLE TO WORK FOR YOU!



A. FAST APPROACH—Pressing button (finger-tip control) moves ram up to work at fast speed, using primary hydraulic pressure. Ram returns instantly to starting position any time button is released.



B. WORK STROKE—Hydraulic pressure is automatically intensified, and the riveting, punching, forming, bending is completed.

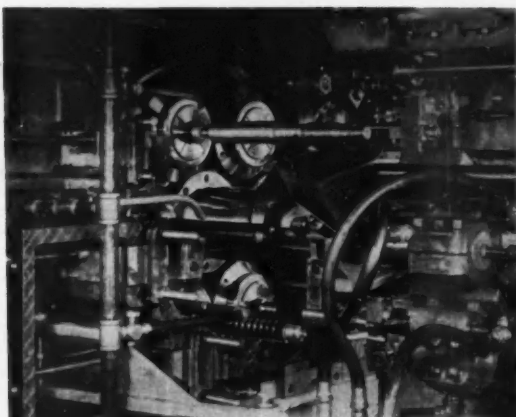


C. AUTOMATIC RETURN—At peak hydraulic pressure (adjustable), the ram reverses automatically; returns to starting position.

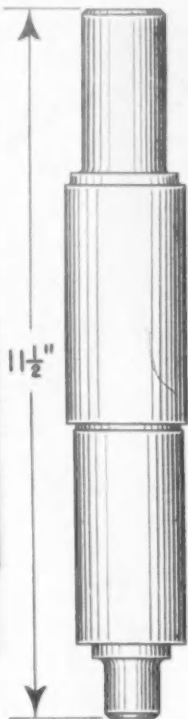
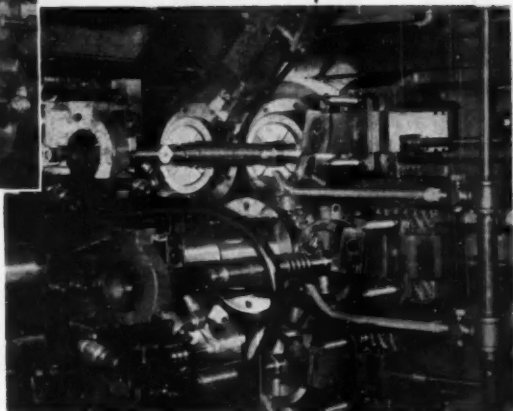
do ALL you CAN do...with

HANNIFIN

Air Cylinders • Hydraulic Cylinders • Hydraulic Presses • Pneumatic Presses • "Hy-Power" Units • Air Control Valves



Tooling Area 3¼-SIX
 ← Front Side Rear Side →



Automotive
Transmission Shaft

A very good reason why CONOMATICS handle a wider variety of machining operations per single chucking is their greater number of tooling positions.

WITH MORE TO SELL THERE'S MORE TO TELL

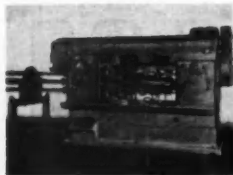
Whether you're selecting a new golf club, motor car, or multiple spindle bar automatic, you want what best fits into the "scheme of things."

Before you can be sure that any product will meet your requirements you must have information. And you can judge only by that at hand or available. Complete information lets you decide what's important to you. That's as it should be.

There's always more information to be had about the product that has more to offer. It's that way about CONOMATICS. And you can always have complete information. If you will write, wire, or phone, you can have it now.



A Comparison of ALL Automatics is in favor of Cone



Conomatic

CONE AUTOMATIC
MACHINE COMPANY, INC.
WINDSOR, VT., U.S.A.



Wean-Hallden
LOW COST SYNCHRONIZED
AUTOMATIC SHEAR LINES

THE installation of a Wean-Hallden Synchronized Automatic Shear Line assures you the most efficient shearing operation available today. The Wean-Hallden, while actually requiring less floor space, delivers up to twice the production.

Infinite variable lengths from 12-inches to 12-feet at speeds up to 200 FPM with accuracy better than commercial tolerances means faster production, reduced labor costs and minimum scrap loss for you. *Before You Buy—Investigate Wean-Hallden.*

If you are in the business of handling strip steel or fabricating steel parts or products from strip steel you should give your slitting operation high consideration.

Well designed slitting lines enable you to reduce inventories, lower labor costs and eliminate expensive extras. Wean engineered slitting lines give you these important factors at lowest initial costs.

If you have a slitting problem — or merely desire a check on the efficiency of your present operation — call in Wean specialists.



Large or
Small

Wean CAN
SOLVE YOUR
SLITTING
PROBLEM

Wean

Equipment Corporation
CLEVELAND, OHIO

AIR-PAK

HYDROVAC

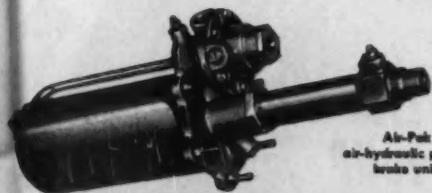
Either Way - YOU'RE ON THE ROAD TO BETTER POWER BRAKING!

There's no need to be puzzled about the question of efficient power braking for any commercial vehicle. Where the preference is for a hydraulic system, Hydrovac, with over two and a half million installations, has proven itself the undisputed leader in its field. And for vehicles where air actuated brakes are the choice, the new Bendix Air-Pak air-hydraulic power braking unit is foremost in its field.

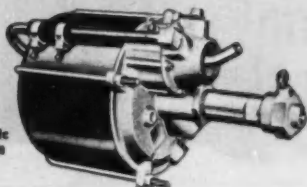
Air-Pak, similar in design and principle to the Hydrovac, changes air pressure into hydraulic pressure by means of two direct connected pistons, thus combining all the well proven advantages of hydraulic brake action with an air brake system.

Products of twenty-five years of practical braking experience, these outstanding power braking systems offer faster, more positive and better controlled braking. And in both the vacuum and the air actuated units, brakes can be applied instantly by foot power alone—a safety factor of tremendous importance. Remember, regardless of size of vehicle or whether your preference is for vacuum or air actuated brakes, for the industry's finest power braking systems—specify Bendix® Hydrovac® or Bendix Air-Pak.

*REG. U. S. PAT. OFF.



Air-Pak
air-hydraulic power
brake unit

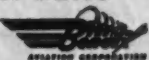


Hydrovac
vacuum-hydraulic
power brake unit

BRAKING HEADQUARTERS for the AUTOMOTIVE INDUSTRY

BENDIX • PRODUCTS DIVISION • SOUTH BEND

Export Sales: Bendix International Division, 73 Fifth Ave., New York 11, N.Y. • Canadian Sales: Bendix Sales of Canada, Ltd., Windsor, Ontario, Canada



Bendix Products Division



AUTOMOTIVE INDUSTRIES

EDITORIAL STAFF

James R. Custer, Editor
Joseph Geschlin, Detroit Editor
H. H. Roberts, Engineering Editor
Marcus Ainsworth, Statistician
Wm. T. Bostelman, News Editor
Robert P. Homer, Asst Editor
Thomas MacNew, Asst Editor
Leonard Westrate, News Editor, Detroit
R. Raymond Kay, Pacific Coast Ed.
Howard Kohlbrenner, Art Director
W. F. Bradley, European Correspondent

WASHINGTON BUREAU

George H. Baker, Washington Editor
Karl Rannells, Washington News Ed.
Ray M. Stroupe, Washington News Ed.

Paul Wooton, Washington Member,
Editorial Board

BUSINESS DEPARTMENT

G. C. Buzby, President and Manager
Automotive Division
E. H. Miller, Advertising Mgr.
E. W. Hevner, Circulation Mgr.
John Pfeffer, Promotion Mgr.
Charles W. Hevner, Research Mgr.

REGIONAL MANAGERS

CHICAGO—John T. Hoole
916 London Guarantee
and Accident Building
Chicago 1, Ill.

DETROIT—E. E. Elder
1015 Stephenson Bldg.
Detroit 2, Mich.

PHILADELPHIA and NEW YORK—
Nelson W. Sieber
Chestnut and 56th Sts.
Philadelphia 39, Pa.
and
100 East 42nd St.
New York 17, N. Y.

CLEVELAND—Jack C. Hildreth
1030 National City Bank Bldg.
Cleveland 14, Ohio

SAN FRANCISCO—R. J. Birch
300 Montgomery St.
San Francisco 4, Calif.

LOS ANGELES—L. H. Jackson
3156 Wilshire Blvd.
Los Angeles 5, Calif.

Editorial and Business Executive Offices
Chestnut and 56th Sts., Philadelphia 39, Pa.
Cable Address Autoland, Philadelphia

High Spots of This Issue

★ TRANSPORT . . . Russia's Achilles' Heel?

This immensely timely and highly authoritative major article—complete in this issue—presents the formidable facts on both strengths and weaknesses of the Russian transportation system in Peace and for War. Authored by Holland Hunter, Assistant Professor of Economics at Haverford College, it raises and answers important questions as to handicaps of Russian transport under Nationalization. Turn to page 39.

★ Ford Luxury Model Added to Line in France

Shortly to be placed in production is a new Comet model. It has all the characteristics of the present eight-cylinder Vedette, mechanically, but in lines and body construction is entirely distinctive. See page 37.

★ Aircooled Engine That Starts at —65F

Some of these new units, developed by Continental Motors Corp. of Muskegon, Mich., are already being used by the Army Air Force in a wide range of ground installations. Known as the Packette series, they are described and illustrated, page 32.

★ Small Gas Turbine That May Be Started by Hand

This interesting paper discusses the mechanical construction, performance and field of application of the Model T-45 prime mover, designed by the Solar Aircraft Co. on Navy contract specification. See page 34.

★ 24,000 Hp. Dynamometer for Testing Turbo-Jet Engines

Capable of transmitting torque to equipment being tested at any speed from 1210 to 15,072 rpm in either direction of rotation, this machine is described, page 36.

★ 30 New Products Items

And Other High Spots, Such As:

The SAE West Coast meeting; effects of Britain's nationalized transport system; the industrial truck system at Bendix Aviation plant; the new cars announced by Vauxhall for 1952; a fluid hydroformer that converts 55 octane naphtha to 98-175; news of the machinery industry; the Business Pulse; and new defense facilities authorized by the Government.

*News of the Automotive Industries, Page 17
For Complete Table of Contents, See Page 3*

AUTOMOTIVE INDUSTRIES COVERS
PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES
• BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY •
PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT
SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT
ENGINEERING • PRODUCTION • MANAGEMENT

How to Help Stretch the Steel Supply

1. Tell Us All!

You'll be helping to make the most of available steel if you give your supplier full information when ordering. For instance, by giving us your length multiple—the cut length you will actually use, you may enable us to fill your order in "shorts." Moreover, when we know your multiple, it may be possible to ship pieces that will cut with minimum waste, thus reducing your scrap loss. Whenever possible, also give alternate gauges, sizes and qualities that may be used when your exact requirement is not available.

2. Make It Last!

Because breakdowns may necessitate replacements not readily available under present conditions, extra care of machinery is essential. With only a little more than routine maintenance, such as proper painting and lubricating, the useful life of plant property and equipment may be prolonged.

3. Turn in Your Scrap!

To keep record steel production rolling the mills must be fed a constant flow of scrap. For every ton of steel produced, at least a half-ton of iron and steel scrap is needed. Now is the time to comb your plant for old, worn-out, or outmoded machinery and equipment—anything that constitutes "heavy melting" scrap—and turn it back into channels of use. Your Ryerson representatives will

gladly advise you on how best to sell your scrap quickly and profitably.

Our organization is constantly on the watch for ways to make more steel available to our customers. While our stocks are currently out of balance from a size standpoint, we do have a large tonnage of carbon, stainless and alloy steels on hand for quick shipment. So call us when you need steel, and we will work closely with you.



RYERSON STEEL

STEEL-SERVICE PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • DETROIT • CINCINNATI • CLEVELAND
PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO

News of the AUTOMOTIVE INDUSTRIES

Vol. 105, No. 6

September 15, 1951

K-F Using Aluminum in Test Engines

Kaiser-Frazer has revealed that it has under test several cars equipped with experimental engines containing wide applications of aluminum. The power plants are of the valve-in-head type, and include V-6's and V-8's in addition to in-line four and six cylinder designs. The engine program has been underway for four years. It includes studies on extensive substitution of aluminum for iron and steel in such parts as engine blocks, clutch housings, and cylinder heads.

British Show 30 New Models in Boston

Opening in Boston on Sept. 10, a special British automobile show displayed 30 new models representing 16 different makes. A full range of cars were shown, ranging from low-priced economy models to expensive, luxury-type sedans and fast, record-holding sports cars. Ranging between the Ford Anglia and the Rolls-Royce Silver Dawn model were full lines of four- and six-passenger family sedans, roadsters and convertibles, including the latest versions of the Austin, Hillman Minx and Morris sedans and convertibles.

Power Steering Expected on Two GM Lines

It is fairly well established that Cadillac, and possibly Buick, will have power steering on 1952 models. However, the unit would not be the Gemmer Gear development used by Chrysler and known as Hydraguide. GM's Saginaw Steering Gear Div. has been developing a power steering unit of its own for several years, which will be used on the GM products.

Materials Curbs Cut July Vehicle Output

Factory sales of passenger cars and trucks during July were the lowest in 18 months because of government restrictions on materials, according to the Automobile Manufacturers Association. Sales to dealers and other customers, such as units of government, amounted

to 492,311 units, which was more than 20 per cent below the June level and 30 per cent under July a year ago. Passenger car production in July was 21 per cent below June and truck output was down 18 per cent. Although motor vehicles exported declined in number about eight per cent below June, their percentage of total production amounted to 8.3 per cent, the highest for any month in the postwar period.

New Car Shortage May Come Late This Year

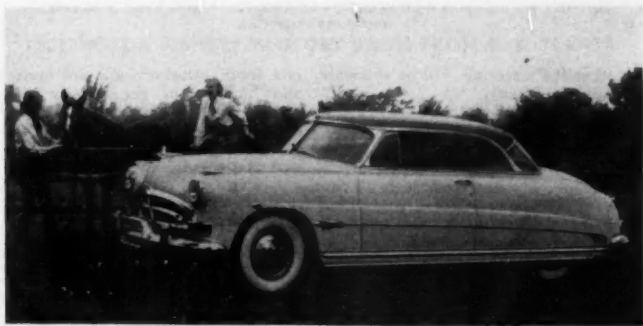
There is considerable opinion in the automobile industry that a shortage of passenger cars will develop by year end. The predictions are based on expected curtailments of production because of NPA restrictions and shortages of materials. However, with prices increased and excise taxes almost certain to go up to 10 per cent, demand may also suffer somewhat. At any rate, if and when a passenger car shortage develops, it should be nothing like the mad scramble immediately following the end of World War II.

Fourth Quarter Outlook Not Bright

It now looks as though passenger car production during the third quarter

will wind up just a little short of the 1.2 million units set for the industry by NPA. The reason is that some of the independents have fallen so far behind their quotas that they will not be able to catch up in September. Actually, the 1.2 million mark would have been missed much further had it not been for the Big Three and Nash and Studebaker, all of which exceeded their quotas by using up materials in inventory at the beginning of the quarter. During the fourth quarter, however, they may not use carryover materials to exceed their allotments. August production is estimated at about 425,000 passenger cars and 123,000 trucks. It is expected, however, that production will sag even further in September, and will aggregate about 365,000 cars and approximately 108,000 trucks.

The outlook for the fourth quarter is not too bright, particularly in view of the copper strike which put a severe strain on the supply which was already becoming critical when the miners walked out. There has been no immediate effect from the copper strike, but it will certainly show up later and it is entirely possible that some plants may have to curtail or close temporarily when the delayed action effect in the strike shows up on the assembly lines. Also, the materials situation tends to become more confused as the industry shifts into CMP. It is understood that



HUDSON HOLLYWOOD

A new addition to the 1951 Hudson series is the Hollywood model, featuring the lines and full-vision windows of the hard top body design. Hollywood styling is available in the Hudson Hornet, Commodore Custom, and Super-Six series.

News of the AUTOMOTIVE

unofficial fourth quarter allocations to passenger car builders show an imbalance between the amounts of steel, aluminum, alloys, and copper, so that if the situation is not corrected, production will be limited by the amount of the material with the lowest allocation. Actually, the situation is so confused and clouded that there is little indication of whether or not allocation of 1.1 million cars for the fourth quarter will officially be set by NPA and if so,

section, styling section, and a service center. A metallurgy building, housing an experimental foundry, will be completed in the near future. A GMR mechanical (dynamometer) building is half completed and ground has been broken for the processing (shop) building.

The engineering staff building is ultra-modern in design and is of glass window and porcelain panel construction with masonry end walls. It is about 370 ft long by 53 ft wide. North

NPA Issues Nickel-Bearing Stainless Steel Schedule

Nickel-bearing stainless steel may still be used for important functional parts of civilian products but not for decorative purposes. This was emphasized by the National Production Authority in explanation of Schedule A to M-80, which contains a list of more than 300 products in which the use of nickel bearing steels and nickel silver is forbidden. Definition of stainless steel in Schedule A, Sec. 1 (a) refers only to steels containing 1 per cent and not more than 22 per cent nickel, and in no way applies to non-nickel-bearing or straight chrome grades. Also according to definitions, straight chrome stainless steel is that containing a minimum of 10 percent chromium and no nickel. There is no prohibition against its use for either non-functional parts or decorative trim.

Passenger car makers have, thus, straightened out their difficulty with NPA over continued use of chrome steel for bright work trim. An amendment to the nickel order was at first interpreted to mean that all chrome steels would be banned. However, the industry pointed out that the steel it is now using for trim contains no nickel whatever and apparently has convinced Washington that it should not be classified with nickel bearing steels.



TWENTY PER CENT MORE

The Ferguson "30", a new two and three-plow farm tractor, recently announced by Harry Ferguson, Inc., is now in production. The tractor is powered by a new engine that is an outgrowth of the engine used in previous models, featuring many important changes and improvements. Of four cyl. valve-in-head type, it has a bore of $3\frac{1}{4}$ in., stroke of $3\frac{1}{8}$ in., displacement of 129 cu in. Output of the bare engine is 35 bhp at 2000 rpm, an increase of 20 per cent over the previous model. In addition, the engine has unique torque characteristics designed for maximum performance in the tractor with a torque peak around 1000 to 1100 rpm. Among the other significant changes are: Intake valves $1\frac{1}{4}$ in. diameter and exhaust valves $1\frac{1}{8}$ in. diameter. Exhaust valves, in addition, are fitted with Thompson Products positive valve rotators, a feature said to be unique in tractor engine practice.

whether the materials will be available to build that many.

GM Technical Center Opens First Unit

GM has completed from 35 to 40 per cent of its new multimillion dollar Technical Center project north of Detroit. It has already completed and in operation three units: a three-story building, which is headquarters of the engineering staff, an engineering staff shop building, and a new dynamometer building. The overall Technical Center will be completed within the next two or three years on the 813-acre site and will eventually include the Research Laboratories Div., process development

and south exterior walls are built almost entirely of hermetically sealed, double-plate heat and glare absorbing glass, mounted in mullions which serve as columns and constitute an integral part of the building structure. The engineering staff shop building, which connects with the office building, is 570 ft by 160 ft. In most respects it is similar in architectural detail to the office building, with more than 50,000 sq ft of heat and glare absorbing window glass. The dynamometer building is primarily a one-story unit with heating and ventilating equipment housed in the attic floor and motor generator sets and other test control equipment in the basement, leaving the main floor clear for engine test operations.

Thompson to Merge With Muskegon Piston Ring

Thompson Products, Inc., Cleveland, and Muskegon Piston Ring Co., have agreed to merge, provided stockholders of the latter company agree. The agreement calls for exchanging $2\frac{1}{2}$ shares of Muskegon common stock for 1 share of Thompson common stock.

The Muskegon firm supplies original equipment piston rings and has two large foundries which would be useful to Thompson to assure casting for rings sold in the export and replacement fields. Thompson previously has attempted to effect a merger with Perfect Circle Corp., also a piston ring manufacturer, but the deal fell through when the Justice Dept. indicated it did not approve. The Thompson operation includes automotive and aircraft parts plants in Cleveland and Euclid, O., Detroit, Los Angeles, and St. Catherine, Ont., and two subsidiaries, Toledo Steel Products Co., and Ramsey Corp.

Army Developing Three Planes for Test

Developmental models of novel aircraft now under construction may perform well enough when tested to pro-



1951 CHRYSLER SARATOGA

Powered by a 180-hp V-8 engine, the new 1951 Chrysler Saratoga has a 125½-in. wheelbase. The new model is available in five body styles: six and eight-passenger sedans, limousine, club coupe, and Town & Country.

vide an answer to a number of Army problems on reconnaissance, liaison, supply, and evacuation of wounded. Three new noncombat aircraft being developed for testing include: (1) A "fleep," or flying jeep, with removable wings. A partial description of the "fleep" says it is a single-engine, closed-cabin machine intended for reconnaissance work. (2) A "convertiplane" equipped to rise or descend vertically, yet cruise at higher speed than a helicopter. The earliest model is expected to carry two persons. (3) A high-payload helicopter, far larger than the two- to four-ton models now in service. The Army would not verify an unofficial report that this aircraft will be able to carry personnel or equipment weighing 25 tons. However, the possibility of sending units of greater than platoon size from point to point in the battle zone by helicopter has been discussed for many months. No combat aircraft are included in the experimental models under construction.

Plymouth Starts Work on Aircraft Order

Plymouth Div., Chrysler Corp., has started assembly of plane hulls at its Evansville, Ind., plant. Operations are still on a very limited basis since a considerable portion of the plant to be devoted to the work is still being prepared for volume production. Parts of all major sub-assemblies are in production and final assembly on first complete hull was started early in September. More than half of the fixtures required have been installed and are now in use. About 40 per cent of the 500,000 sq ft of space at the plant will be used for the airframe assignment,

with the balance being used for production of passenger cars. Station wagon body assembly was moved to the Briggs plant in Evansville to make space available for the aircraft job.

Continental to Produce Gas Turbines

Continental Motors Corp. will produce gas turbines at its Detroit plants for military use. Continental has obtained exclusive manufacturing rights to build nine gas turbine engines developed under sponsorship of the French Air Ministry by Societe Turbomeca of Bordes, France. The turbines range from 200 to 1100 hp and are of the ducted fan type. Military uses will include applications for gilded mis-

siles, helicopters, target planes, air compressors, utility aircraft and specialized industrial equipment. Initial production of the French turbines will be by Continental Aviation and Engineering Corp., a subsidiary which has been carrying on a gas turbine development program for several years.

Glenn Martin Signs Three Subcontractors

A contract has been signed between the Glenn L. Martin Co., Baltimore, Md., and Kaiser Metal Products, Inc., of Bristol, Pa., whereby the Kaiser Co., under subcontracting arrangements from Martin will engineer, tool and manufacture wings for the twin-jet Canberra night intruder bomber to be built in substantial quantities by Martin for the U. S. Air Force. Martin has also signed contracts with the Majestic Aircraft Co., Moosup, Conn., to build ailerons for the Martin P5M-1 Marlin.

Hudson has also been awarded a subcontract from Martin for production of aircraft subassemblies. It provides for engineering, tooling, and manufacturing of rear fuselage and tail sections for the twin-jet B-57 bomber to be used by the Air Force. Dollar value of the contract was not revealed other than that it will be "in the millions." Hudson also has a contract to build major components for the Wright R-3350 engine, and is now preparing for production. About 250,000 sq ft of Hudson's Detroit plants will be used for the two aircraft orders. The company has sufficient space so that the defense work will not interfere with production of automobiles at the rate permitted by the government.

1951 MOTOR VEHICLE FACTORY SALES FROM U. S. PLANTS*

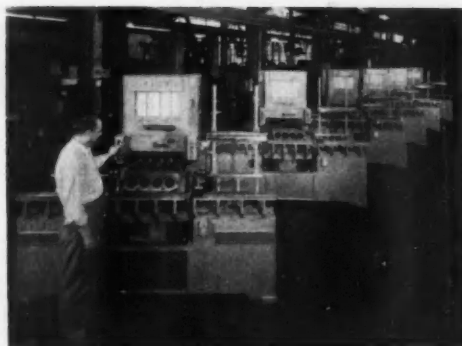
	Passenger Cars	Trucks	Buses	Totals	
				1951	1950
First Quarter.....	1,061,863	376,312	2,011	1,890,176	1,637,489
Second Quarter.....	1,497,066	410,290	2,389	1,909,664	2,112,816
Total—Six Months.....	3,099,898	786,592	4,410	3,886,899	3,750,307
July.....	381,407	110,239	965	492,611	706,702
Total—Seven Months.....	3,480,255	896,831	5,375	4,382,471	4,457,009

1951 MOTOR TRUCK FACTORY SALES BY G.V.W.*

	5,000 lb. and less	5,001-10,000	10,001-14,000	14,001-18,000	18,001-24,000	24,001-30,000	Over 30,000	Total
First Quarter.....	164,304	70,986	26,073	67,689	18,099	10,706	10,443	378,312
Second Quarter.....	174,654	73,998	33,930	77,002	19,918	21,493	10,320	410,290
Total—Six Months.....	338,958	144,984	60,003	144,691	37,017	40,199	20,768	786,592
July.....	48,774	21,238	7,432	22,312	4,796	6,717	2,960	110,239
Total—7 Mos. 1951.....	384,732	166,222	67,435	167,003	41,812	46,916	23,728	896,831
Total—7 Mos. 1950.....	357,969	155,651	56,069	129,724	29,661	23,976	16,963	706,823

*—Automobile Manufacturers Association.

News of the AUTOMOTIVE



INSPECTING

Leading the way in the use of automatic gaging machines for the rapid and accurate inspection of critical dimensions is the automobile industry. Here are shown six Sheffield Corp. huge precision-bore automatic gaging machines for the inspection of cylinder bores in engine blocks.

Curtiss-Wright Buys New Buffalo Plant

The Curtiss-Wright Corp. has purchased additional plant capacity for its new Metals Processing Div. in Buffalo, N. Y. The acquisition of the Otis Elevator Co. works has more than doubled the capacity of the new division. The Otis works, involving buildings totaling 144,000 sq ft of floor space on a 27 acre tract, adjoin the former plant of the Buffalo Stainless Castings Co. which was purchased by Curtiss-Wright on July 20 as headquarters for the new Metals Processing Div. These new plant and land purchases bring floor space for manufacturing to a total of more than 250,000 sq ft and increase the total land area for present buildings and future expansion to over 30 acres.

Chrysler Clears Ground for Jet Plant

Chrysler has started clearing ground for the new 1.6 million sq ft jet engine plant it will build for the Navy. The plant will be built a few miles north of Detroit on a 306-acre site. The cost of the plant without equipment will be approximately \$30 million, indicating an expenditure of two or three times that much for machine tools and equipment since Chrysler's initial contract to build, equip, and operate the plant was for \$91 million. It will be owned by the Navy and is to be called the Chrysler Jet Engine Plant. It is expected that Chrysler will be able to start production of the J-48 jet engine at the plant by early 1953.

NPA Studies Revision of Car Maker Quotas

NPA is reported to be reconsidering percentages of industry production for each automobile manufacturer. The ac-

tion is taken because of a recent amendment to the Defense Production Act which requires that the current competitive position be considered in



BIGGER AND FASTER

Said to be the largest airplane to enter commercial service, this new Lockheed Super Constellation costs \$1.5 million. A bigger and faster version of the present Constellation, the plane is 18 ft longer, and is designed to use jet engines.

allocation of materials. It is not expected, however, that any changes in individual percentages will be used as a basis for setting production schedules and allotments for materials until the first quarter of next year. The industry percentage currently in effect were based on the years 1947, 1948, and 1949 primarily, with 1950 figures used, but not given too much weight. It is understood that percentages will be drawn showing standing of the various companies for both the first and second halves of 1950, and the first and second quarters of 1951. However, it is not known yet what the actual base will be for recalculating the individual percentages.

Convair Gets Contract to Develop Atomic Plane

The Consolidated Vultee Aircraft Corp. has been awarded a development contract for America's first atomic-powered airplane. Convair will be concerned principally with developing the airplane, while the General Electric Co. will have primary responsibility for developing its nuclear propulsion system.

Harrison Radiator Applies for Necessity Certificate

GM's Harrison Radiator Div. has applied to the Defense Production Administration for a certificate of necessity for a \$3,931,000 expansion at its West Lockport, N. Y., plant. The expanded plant facilities are sought for work Harrison will do in Lockport on U. S. Air Force turbo-jet engines. The Lockport plant has a contract to manufacture a major component of the Sap-

phire turbo-jets that will be built by GM's Buick Motor Div. Harrison also has applied for a certificate of necessity for \$197,000 of tooling and machinery, to be used in connection with truck radiator production. The expansion planned by Harrison will be an addition to the present plant in West Lockport. It will increase plant space 50 per cent, adding 350,000 ft of space.

See Farm Machinery Needs Up in 1952

At least 15 per cent more new farm machinery will be needed next year than was required in 1949. For repair

INDUSTRIES

and replacement parts, the needs will be 20 per cent more. This forecast is based on a recently completed survey by the Agriculture Dept., the results of which will be used on a basis for requesting allotments of controlled materials for the manufacture of farm machinery, implements and equipment for 1952.

Major emphasis will be on heavier types of equipment and tractor-drawn implements, reflecting the increasing mechanization trend. Requirements for animal-drawn machinery will be down to 25 or 30 per cent less than in 1949, in numerous instances. Among the biggest increases in demand will be farm irrigation equipment which will run from 35 to 75 per cent above 1945 requirements, partly because of current scarcities in motors, pumps, and pipe as a result of raw material shortages. Movement of farm labor to defense plants and into the military services is reflected in a rising demand for tractors, crop pickers and harvesters, and sprayers and dusters.

Government to Increase Rubber for Tires

The crisis in rubber is over and the government expects to grant manufacturers of tires all reasonable requests for rubber by the first of next year. Currently, use of rubber in tires and other civilian goods is limited to 90 per cent of consumption in the year preceding the Korean war. Lifting of restrictions will apply primarily to synthetic rubber with natural products still under control. The government recently raised prices of synthetic rubber 1½¢ a lb, but this is not expected to result in an increase in tire prices.

GSA Spells Out Procedure for Tool Repayments

A simplified procedure for repayment of government advances to machine tool manufacturers on pool orders has been spelled out by General Services Administration. The agency is authorized to advance up to 30 per cent of the amount of each pool order to aid in obtaining materials and provide working capital. Such advances carry a four per cent interest rate. Under the announced repayment procedure, the tool builder may repay the government on a unit by unit basis as each individual tool is sold instead of waiting to settle up when the entire pool order is completed.

Chrysler Expands Number of Defense Suppliers

Chrysler, during the past three months, has added greatly to the number of suppliers for its defense assign-

ments. More than 500 companies have been added to the supplier list, with about 92 per cent employing fewer than 100 persons and another six per cent employing between 100 and 500. Chrysler now has 1765 defense projects suppliers from all sections of the country, and is lining up an additional 3000 companies to be taken on as defense work accelerates.

Federal Truck Gets RFC Loan of \$3.5 Million

RFC has granted a \$3.5 million loan to Federal Motor Truck Corp. The money will be used to finance production of trucks and parts of the government.

SAE Tractor Meeting Held in Milwaukee

Holding a national tractor meeting and production forum in Milwaukee, Wis., from Sept. 10-13, the Society of Automotive Engineers studied present and prospective engineering requirements in the fields of tractors, farm implements, and earth-moving equipment. The production forum, with seven separate round table discussions, covered gears, materials handling, quality control, welding, heat treating, forging, and foundry.

API Refining Div. Meet in San Francisco in '52

W. L. Stewart, Jr., vice president for refining, American Petroleum Institute, has announced that the 17th mid-

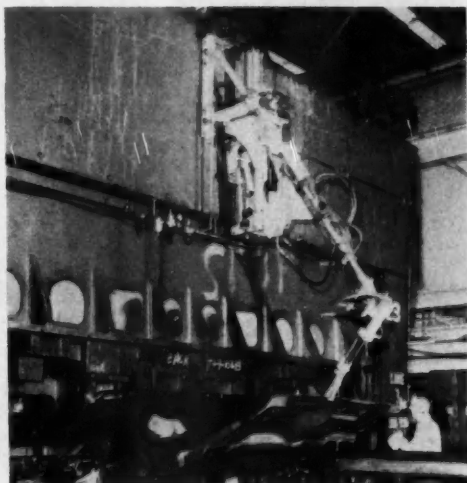
year meeting of the Division of Refining will be held in San Francisco, Calif., May 12-15, 1952. Besides a full schedule of committee meetings, an elaborate technical program is being planned by the program committee under the chairmanship of W. M. Holaday, director of Socony-Vacuum Laboratories, New York. Technical sessions are tentatively planned on a number of basic refinery subjects. Offers will be approved at the next meeting of the program committee, scheduled for the first week in November. Offers on the following subjects are welcomed and should be addressed to these committees: (1) corrosion and corrosion prevention, E. Q. Camp, Humble Oil & Refining Co., Baytown, Tex.; (2) electrical equipment, L. M. Goldsmith, the Atlantic Refining Co., Philadelphia, Pa.; (3) analytical research, E. L. Baldeschwieler, Standard Oil Development Co., Linden, N. J.; (4) waste disposal, L. Mittelman, Tide Water Associated Oil Co., San Francisco, Calif.; (5) training personnel, T. M. Rushing, the Texas Co., New York City; (6) automotive fuels and lubricants, T. B. Rendel, Shell Oil Co., New York City; and (7) new refining processes, W. T. Gunn, American Petroleum Institute, New York City.

Willys Jeep Wins Award for Style

Although the Willys Jeep has never claimed any laurels for its styling, it has, nevertheless, turned up unexpectedly as one of eight automobiles selected for an art exhibit at New York City's Museum of Modern Art. The

IRON HAND

That the principle of automation is spreading is evident from this view taken in Kaiser-Fraser's press shop at Willow Run. The "iron hand", has been installed on a row of large presses producing floor pan stampings. The "iron hand" may be seen in the act of removing the large, hard-to-handle, stamping from the press and depositing it onto the shuttle conveyor in the foreground which moves the stampings to the next operation at the right. The mechanism shown here is one of the latest models supplied by Sahlin Engineering Co.

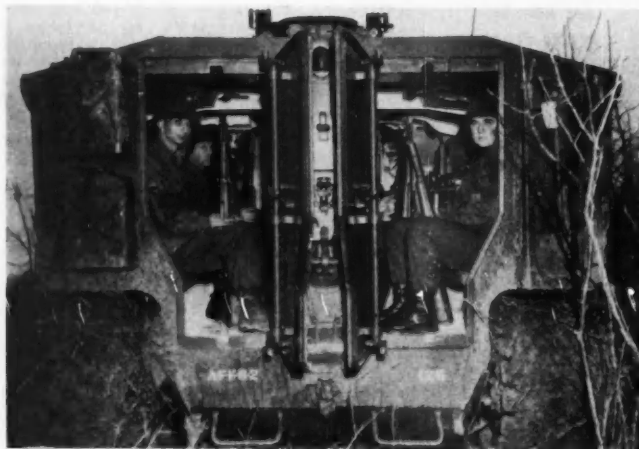


News of the AUTOMOTIVE

museum says that even though the engineers who designed the Jeep were unconcerned with style with which other automobiles are designed, "it (the Jeep) substitutes for a deliberate esthetic program, the formative principles of construction so that its design is unified by the economy with which each part is fitted for its purpose. It is one of the very few genuine expressions of machine art." The eight cars selected for the exhibit "for their excellence as works of art and for their relevance to contemporary problems of car design" are the Jeep, Lincoln Continental, Cord, Bentley, Cisitalia, Mercedes, MG, and Talbot.

Automatic Drive Ratio Remains Unchanged

There are no present plans to reduce the percentage of cars equipped with automatic transmissions. During the third quarter, NPA tacitly agreed on a formula of automatic transmissions for 35 per cent of lower priced cars, 65 per cent in the medium priced bracket, and 100 per cent on high priced cars and that distribution will continue. If it is found necessary because of materials shortages to reduce these percentages, it will be done uniformly across all three classifications.



COMBAT CARRIER

Production of this new type of armored personnel carrier, the T18E1, has been officially announced by the Army. Contracts for manufacture of the \$172,000 vehicle are in effect with the International Harvester Co. and the Ford Machinery & Chemical Corp. Officially designated as a troop carrier for transport of 12-man squads of infantry into combat with tanks, this 20-ton vehicle has also been designed for other uses such as towing artillery, transport of supplies, or service as an ambulance. It is powered by Ordnance's newest Continental six-cyl., air-cooled engine and has the Allison cross drive transmission. It is full-tracked and will travel on improved roads at 35 mph, turn in its own length, and move up or down 60 per cent slopes.

Bendix Forms Outlet in Australia

Bendix Aviation Corp. has formed a new affiliate company in Australia to manufacture and distribute its products. The new company will be called Bendix-Tecnico Proprietary Ltd. Bendix will hold a 40 per cent interest in the firm, with the remaining 60 per cent owned by Tecnico Ltd. of Marrickville, Australia.

1952 ASLE Meeting Set for Cleveland

The 1952 American Society of Lubrication Engineers in Cleveland, April 7-9, will cover the following subjects: lubrication economics, lubrication equipment, hydraulics, and disposal of lubricants.

Hyatt Bearings to Expand in New Jersey

Providing an additional 402,000 sq ft of floor space, preliminary plans have been completed for expansion of the manufacturing areas of GM's Hyatt Bearings Div. plants in both Harrison and Clark Township, N. J. New structures at the Clark Township plant will provide an additional 390,000 sq ft of

floor space, doubling the existing facilities. Alterations to the Harrison plant will provide an additional 12,000 sq ft of manufacturing area.

Automotive Wages Rise One Cent an Hour

Automobile and truck manufacturers' costs went up another notch Sept. 1, when wages rose one-cent an hour as a result of an increase in the BLS cost of living index. Hudson and Packard also received WSB approval for annual improvement factor raises of four-cents an hour, due under their contracts with the UAW-CIO. The Hudson increase was made retroactive to Aug. 14, and the Packard raise to Aug. 27. The BLS index, as of July 15, stood at 185.5, the highest on record, and brings the total hourly increase since the cost of living formula was adopted to 20-cents an hour. In addition to the hourly increases, manufacturers make quarterly adjustments, based on the cost of living formula, to salaried employees.

'52 Vehicle & Maintenance Show in New York City

The 1952 National Transport Vehicle Show and Fleet Maintenance Exposition will be held in New York City Feb. 26-28. In addition to demonstrations and instruction in the practice of preventive maintenance, this annual national gathering of commercial vehicle fleet men provides contact between fleet engineers and members of the engineering staffs of truck manufacturers and provides a single time and place at which to compare the features of competitive trucks.

Body Engineers Set Convention Topics

The American Society of Body Engineers has completed the program for its Technical Convention, to be held in Detroit, Nov. 7, 8, and 9. The Wednesday sessions will cover general characteristics of body paints, colors, and interior materials such as imitation leather and synthetics. Thursday will be devoted to small car and foreign car designs and their affect on American body designers, special requirements for taxicabs and police cars, and development of body engineers. Friday sessions will cover body materials and finishes such as plastics and the problems of attachment connected with the interior, theory and application of quality control, and design and requirements of military bodies.

INDUSTRIES



TRUE AND FLAT

Cylinder head face of the head and barrel assembly for AV-1790 military engines is lapped true and flat in the Crane Lapmaster "48" lapping machine recently installed by Continental Motors in its Getty Street plant in Muskegon. As shown, the machine table has four stations, holds two cylinder assemblies at each station.

Dow Expansion to Cost \$100 Million a Year

Dow Chemical Co. expects to spend \$100 million a year for the next several years on new plant facilities. The expansion program is necessary because of requirements for both civilian and defense production despite the expenditure of \$59 million a year for new facilities over the past five years.

Vehicles Top \$37 Million in '51 Marshall Plan

Marshall Plan purchase approvals issued for 17 Western European countries during fiscal year 1951 totaled \$2,161,900,000. This represented a drop of nearly 40 per cent from the 1950 fiscal year total which was \$3,592,090,000. Motor vehicles, engines and parts for the 1951 fiscal year totaled \$37.5 million as compared with the 1950 fiscal year total of \$72.4 million.

Mexican-Pan American Race in November

The second Mexican Pan-American Race will be held Nov. 20 to 25, when about 200 modified stock cars will race the 1933 miles from Tuxla Gutierrez to Juarez (across the border from El Paso, Tex.). Prize money is \$68,380.

Standard Products to Build Big Kentucky Plant

Plans for construction of a million-dollar plant in Versailles, Ky., have been announced by the Standard Products Co. as part of an expansion program required by increased orders. Harry D. Myers, president of Standard Products, said that the new plant would be about 150,000 ft in size, a brick and steel fac-

tory and office building, employing about 300 persons in the manufacture of the company's regular civilian items as well as military products.

Ford Expands Engine Development Program

Ford is expanding its engine engineering program, putting greater emphasis on progressive engine design and development. A separate engineering staff department will be set up to consolidate all the engine design development and production activities for

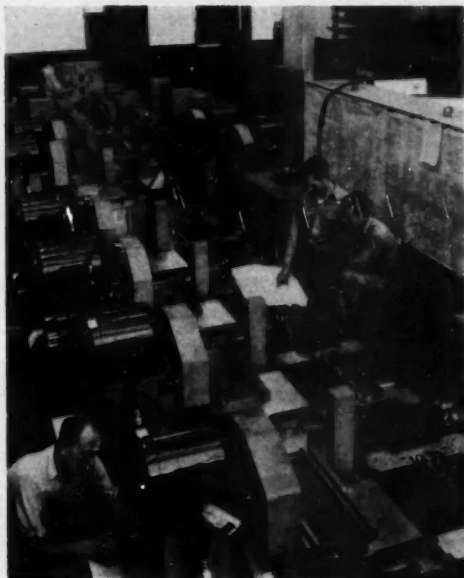
all divisions of the company. It will be under the direction of Victor G. Raviolo, formerly engine assistant to the chief engineer.

Wagner Electric Acquires Big Tract for Expansion

Wagner Electric Corp. has acquired a 52-acre tract of land for development as part of a current expansion program. The recently acquired property is located in northwest St. Louis not far from the main factory. It is to be the site of a new modern processing plant for the manufacture and packaging of Wagner Lockheed Hydraulic Brake Fluid, and the new building will have approximately 63,000 sq ft of floor space.

Schneider Torque Converter in 1939 Diesel Locomotives

It has been called to our attention that in the Chronological History of Automatic Transmission Developments, which was published in the August 15 issue of *AUTOMOTIVE INDUSTRIES*, we omitted listing the Schneider hydraulic torque converter and Hydro two-speed gearbox that were used in the Diesel-Hydraulic switching locomotives introduced in 1939 by the General Machinery Co. The White Hydro-Torque Drive, introduced in 1946, also is equipped with a Schneider hydraulic torque converter. (Turn to page 154, please)



FOR L-HEADS

This is a large Bore-Matic transfer machine at the Heald Machine Co. plant, Worcester, Mass., prior to its shipment recently to an automobile manufacturer whose cars are equipped with L-head engines. It is designed for precision finishing valve guide holes and valve seats in cylinder heads. Heald this year is celebrating its 125th anniversary.

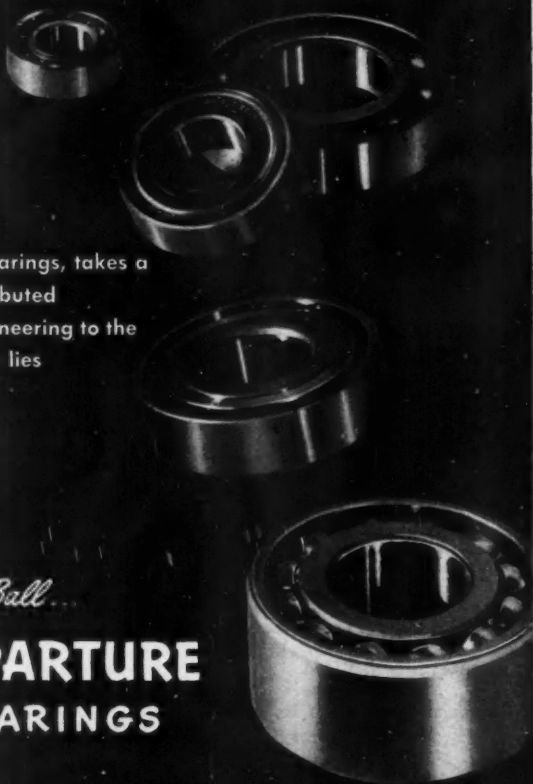
Outsells...
because
it excels

New Departure, world's largest
producer of ball bearings, takes a
natural pride in having contributed
62 years of creative engineering to the
industrial development wherein lies
our country's strength.

Nothing Rolls Like a Ball...

**NEW DEPARTURE
BALL BEARINGS**

NEW DEPARTURE • DIVISION OF GENERAL MOTORS • BRISTOL, CONNECTICUT



Men in the News

Current Personnel Appointments and Changes at Plants of Automotive Manufacturers and Their Suppliers



General Motors Corp.—George Russell has been elected treasurer of the corporation, succeeding Meyer L. Prentis who has retired.



Micromatic Hone Corp.—William H. Harris, Jr., was elected vice president in charge of engineering.



Willys-Overland Motors, Inc.—Howard P. Grove has been elected vice president in charge of sales.

the newly-created position of sales promotion manager of the Replacement Sales Div.

ACF-Brill Motors Co.—George E. Allen, Ralph F. Peo, and Paul E. Reinhold have been elected to the board of directors.

Sealed Power Corp.—Rick E. Murbarger has been elected general sales manager.

Federal Motor Truck Co.—Chandler A. Rogers, secretary-treasurer and director, has retired. Edmund C. Dickerson, formerly assistant treasurer, has been named secretary-treasurer and director to succeed Mr. Rogers.

The Timken-Detroit Axle Co.—Harvey R. Cook has been named advertising manager.

Illinois Tool Works—Fred Bohle has been appointed manager of the recently-organized Machine Tool Development Dept.

The DoAll Co.—Bernard E. Aldridge has been appointed sales manager of the new Cutting Tool Div.

General Controls Co.—Henry B. Sanford, Jr. has been appointed advertising and sales promotion manager.

Ainsworth Manufacturing Co.—Warren H. Farr is now president of the company, succeeding Raymond J. Purdy who has resigned. Mr. Purdy will continue to serve on the board of directors.

P. R. Mallory & Co.—George G. Mercer, has been appointed director of purchasing, and W. J. Topmiller, Jr. moves up to the post of purchasing agent.

Dearborn Motors Corp.—Donald W. Sawyer has been appointed parts sales manager.

Oerlikon Tool and Arms Corp. of America—Lt. Gen. K. B. Wolfe, who recently retired as Deputy Chief of Air Staff, Materiel, USAF, has been appointed president.

Fairchild Engine and Airplane Corp. Fairchild Aircraft Div.—Joseph H. Baylis has been named director of industrial relations.

Kaiser-Frazer Corp.—Joseph Kroll was appointed manager of the experimental division.

United States Rubber Co.—H. E. Humphreys, Jr., president, has been elected to the additional post of chairman. He will continue as president.



United States Rubber Co.—John W. McGovern, a director, vice president and general manager of the tire division has been elected a member of the executive committee.



United States Rubber Co.—Howard N. Hawkes, assistant general manager of the tire division, has been elected a vice president and appointed general manager of the tire division, succeeding Mr. McGovern.



General Electric Co.—Appointment of W. B. Booth as manager of the company's Pittsfield Ordnance Operation at Pittsfield, Mass., has been announced.

E. I. duPont de Nemours and Co., Inc.—Dr. Cole Coolidge has been appointed director of the Chemical Dept.

The Dow Chemical Co.—Dr. Mark E. Putnam has been elected to the newly-created position of executive vice president.

Allegheny Ludlum Steel Corp.—William B. Pierce has been elected vice president and Roger S. Ahlbrandt, treasurer.

The Electric Auto-Lite Co.—vice president L. H. Middleton was promoted to the post of director of engineering.

Soss Manufacturing Co.—Charles J. Soss has been elected to the newly-created post of chairman of the board of directors and has retired as president. Samuel Soss was elected president.

The Cleveland Graphite Bronze Co.—O. P. Gokay has been elected treasurer. John F. Moriarty has been appointed to

Necrology

William Henry Wallace, 64, vice-president of the Eaton Mfg. Co., and general manager of the Eaton Spring Div., died Aug. 23, in Detroit.

William H. Manning, 50, research engineer, General Motors Corp., died Aug. 24, in Pontiac, Mich.

Warrington B. McCullough, 67, co-founder and president of J. H. McCullough & Son, died Aug. 21, in Abington, Pa.

Clell Perry, 53, speedboat designer and racer, died Aug. 31, in Lincoln Park, Mich.



Hot Lacquer NEWS

PUBLISHED PERIODICALLY BY HERCULES POWDER COMPANY IN THE INTERESTS OF BETTER FINISHES AND REFINISHING

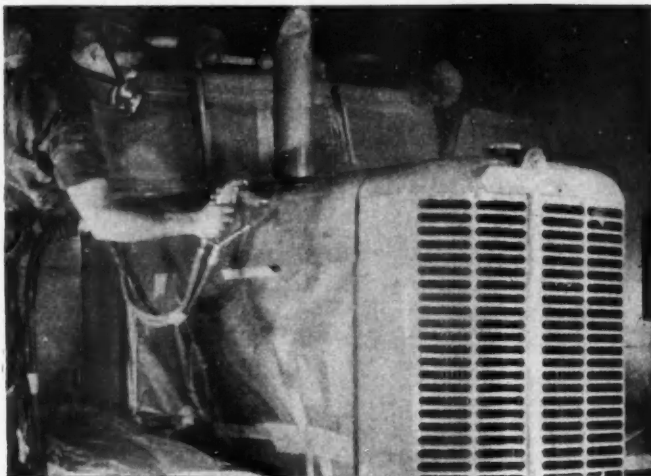
Hot-Spray At Oshkosh Motor Truck Improves Gloss, Speeds Production

Heavy-Duty Trucks Get Heavy-Duty, Low-Cost Finish

Oshkosh 4-Wheel and 6-Wheel drive trucks are designed specially to perform in fields which are too severe for the conventional rear drive trucks. Manufacturing specifications call for a finish that is equally durable—and actual service has proved that hot-spray lacquer does the job.

According to Mr. A. E. Stoll, Production Manager, "Hot-spray lacquer has improved our finish by better gloss, has cut the over spray by use of 60% less thinners and eliminated periods of blushing.

"The elimination of blushing by use of hot-spray solved our problem of slow-up in finish painting during periods of high humidity, which in our climate is quite frequent in summer and fall.



Durable hot-lacquer finish being applied to heavy-duty Oshkosh truck.

"We are satisfied that hot-spray lacquer has improved our finish and increased our painting production."



Typical fleet of Oshkosh trucks, in service for City of Yonkers, N. Y.

NEW MILITARY LACQUER SPEC.

A new military specification for lacquer is now issued and official. Identified as "Military Specification MIL-L-11195 (ORD) Lacquer, Lustreless, Hot Spray (For Ammunition)". Hercules will send you full information on hot lacquer, types of heating equipment available, and the performance record of hot lacquer in many industries.

HERCULES POWDER COMPANY

Cellulose Products Department
946 Market Street, Wilmington, Delaware
CL31-13

HERCULES DOES NOT MANUFACTURE LACQUERS OR HOT LACQUER EQUIPMENT, ONLY THE INGREDIENTS FROM WHICH LACQUERS ARE MADE



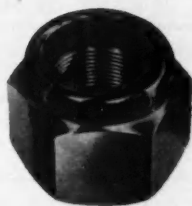
On Battle Roads or Highways ELASTIC STOP NUTS Guarantee Tight Fastenings

Rough terrain and rough handling are hazards to the world famous military 'Jeep'. That's why Willys builds its 'Jeeps' and other vehicles with Elastic Stop Nuts at important points to eliminate fastener failures due to vibration.

In this vehicle the famous Red Locking Collar of the Elastic Stop Nut holds firm against vibration—reduces maintenance—on vital applications such as: accelerator hinge, universal joints, body hold down, spring shackles, radiator hold down, and air cleaner. The Red Collar grips bolt threads firmly—protects against vibration, impact, and stress reversal—prevents freezing of nuts to bolts by protecting internal bolt threads against corrosion.

Check the advantages of Elastic Stop Nuts against any other type of self-locking fastener. You'll find that only ESNA offers a complete line of thread sizes and varied nut types engineered to simplify your assembly line fastening problems and to provide your customers with maintenance-free operation.

Whether you are manufacturing equipment for rough military use or designing better performance and easier maintenance into equipment for your normal market . . . use vibration-proof fasteners. Now is the time to get full information. Write for complete product line bulletin to Elastic Stop Nut Corporation of America, 2330 Vauxhall Road, Union, N. J.



DESIGN AHEAD WITH ESNA

THE FAMOUS RED ELASTIC COLLAR IS VISIBLE EVIDENCE OF LOCKING SECURITY

Threadless and permanently elastic, it provides these 4 outstanding features:

1. Protects against nuts loosening due to VIBRATION
2. Keeps locking threads CORROSION FREE
3. Provides for accurate BOLT LOADING
4. Seals against LIQUID LEAKAGE along the bolt threads

And can be used again and again



ELASTIC STOP NUTS

DESIGN HEADQUARTERS FOR SELF-LOCKING FASTENERS

(Advertisement)

nothing else can do what Microcarb does!

Microcarb is a control system for the carburizing process. It *continuously* measures something that nobody has ever measured before—the active carbon in a production furnace's atmosphere *while the furnace is at work in the heat-treat department*. And it automatically, continuously controls the surface carbon content of the steel on the basis of this measurement.

Microcarb is many things to many men, especially in defense work.

To top management, Microcarb means both higher product quality and lower unit cost! Also, it means that still another manufacturing operation comes under automatic control.

To production executives, Microcarb means closer following of manufacturing schedules, because carburizing speed and results are more predictable. More predictable, that is, even than with our own pre-Microcarb processing installations. And Microcarb helps heat-treaters apply their skill—helps them earn incentive pay.

To metallurgists, Microcarb means simply better carburizing. Perhaps you saw a recent magazine advertisement headed "Thank You, Leeds & Northrup!" in which Indiana Gear Works credits Microcarb as a "big help to the gear industry" and says

"now, for the first time, we are able to control case carbon content on carburized parts"

"... we can produce carburized surfaces with absolute uniform control and obtain absolute maximum hardness and maximum ductility"

"no more retained austenite on wearing surfaces of high nickel steels"

"... no more carbide networks in the hyper-eutectoid zone"

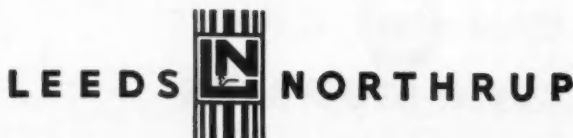
Such results trace back to the fact that with Microcarb the carbon you "set" is the carbon you get. Just as you set a temperature controller at 1700 F, if that is the carburizing temperature you want, so you set the Microcarb Controller at 90 if you want to carburize to ninety carbon. By making the proper setting, you can either protect the surface or add

carbon. Instead of controlling the amount of carbon material supplied to the process, you actually control the amount that does the work. Can you imagine controlling the temperature of a furnace by just measuring the amount of fuel it gets, without a pyrometer to tell the temperature directly? Well, that's the kind of carbon control you have always had—until Microcarb. Microcarb measures and controls carbon directly, just as a pyrometer measures and controls temperature directly.

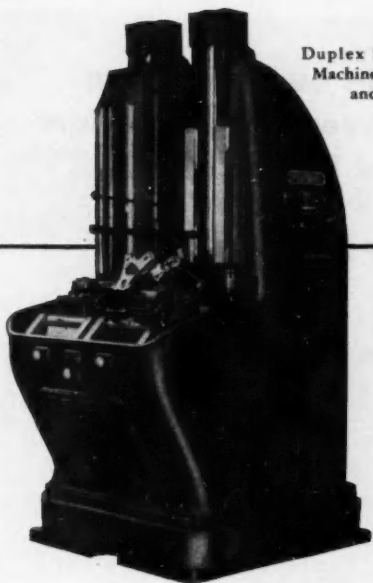
The "reason why" for Microcarb is its carbon-detecting element. This instrument, called a Carbohm, is an engineering rarity—a truly new device for sensing a change in its surroundings. Basically, it's a wire, made of an alloy which will either absorb carbon from the furnace atmosphere, or lose it to the atmosphere, until it and the atmosphere are in equilibrium, carbon-wise. With every change in the wire's carbon content, there's a change in its electrical resistance. This resistance is measured and translated into carbon percentage by the Microcarb recorder and controller.

Only Homocarb Furnace equipments of our new Series H can be used with Microcarb Control, because engineering to meet the needs of atmosphere regulation is a necessity. Specific features are a soundly designed electric furnace with solid-bottom retort, improved fan housing and work support, and aerodynamically designed discharge jets; and Micromax temperature control of the duration-adjusting type specially designed for this service.

Let us send you further facts about this new Microcarb development. Ask our nearest office, or 4966 Stenton Ave., Phila. 44, Pa., for Catalog T-623.



TD4-623 (3)

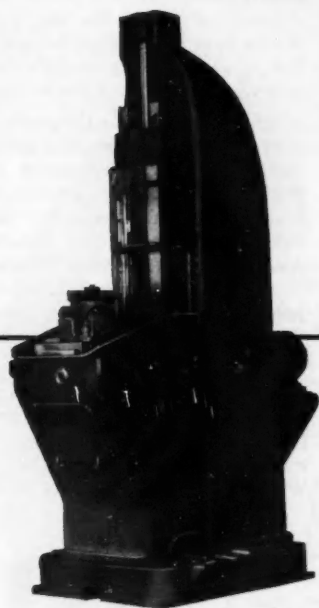


Duplex Surface Broaching Machine. Made in 5, 10, 15 and 25 Ton Sizes.



Continuous Type Broaching Machine. Made in 4 Sizes.

investigate surface broaching for difficult machine work



Single Slide Surface Broaching Machine. Made in 5, 10, 15 and 25 Ton Sizes.

- Many types of work can be surface broached on Footburt machines at remarkable savings over previous machining methods. High production is obtained with required accuracy and finish. Holding fixtures are designed for quick, convenient loading. Cutting tool maintenance costs are low. We will be glad to work with you on the application of surface broaching.

THE FOOTE-BURT COMPANY

Cleveland 8, Ohio

Detroit Office: General Motors Building

FOOTBURT surface broaching

... a time tested line of machine tools

**DAN *
DUGAN
SAYS...**

"In the millions of miles our units have operated, we have never had an accident due to the mechanical failure of

Wagner Air Brakes"



DAN DUGAN
OIL TRANSPORT CO.
Common Carriers
of Petroleum Products
41st & Grange - SIOUX FALLS, S. D.
Telephone 4-6811

DIRECTOR, BUREAU OF
SAFETY, SERVICE FROM
THE FOLLOWING TERMINALS

Sioux Falls, S. D.
Wapetown, S. D.
Mankato, Minn.
Mankato, Minn.
Alexandria, Minn.
Fargo, N. D.
Grand Forks, N. D.
Rock Rapids, Iowa
Sioux City, Iowa
Clear Lake, Iowa

October 20, 1950

Wagner Electric Corporation
111 South Twelfth Street
Minneapolis, Minnesota
Attention: Mr. McElman
Branch Manager

Dear Sir:

Our fleet of 100 trucks operates in four states and is engaged exclusively in the transportation of petroleum products.

At Dugan's, we are proud beyond words of the outstanding safety record compiled by our fleet. During 1949, our fleet covered more than 9,000,000 miles without an injury. Fundamental to such a record, as far as mechanical equipment is concerned, is a good, efficient braking system — brakes which will operate without fail.

* In the millions of miles our units have operated, we have never had an accident due to the mechanical failure of Wagner Air Brakes.

Yours very truly,
DAN DUGAN OIL TRANSPORT CO.

Dan Dugan
Dan Dugan

Dan Dugan Oil Transport Company, like hundreds of over-the-road truckers, have found that the dependability of Wagner Air Brakes have helped them in establishing outstanding records for safety and low brake maintenance.

Wagner Air Brakes are the product of more than twenty years of brake engineering experience gained in the manufacture of hydraulic brakes and brake parts for the automotive industry. The Rotary Air Compressor . . . Power Cluster . . . and other exclusive features are just a few of the reasons why Wagner Air Brakes are nationally recognized as the "best buy."

Give the buyers of your vehicles added brake economy and safety by including Wagner Air Brakes as standard equipment. Get the facts. Write today for Bulletin KU-201.

K51-17A

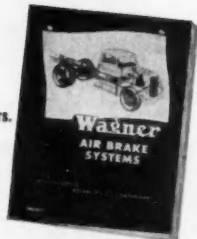


Wagner Air Brake Users are our Biggest Boosters.

Wagner Electric Corporation

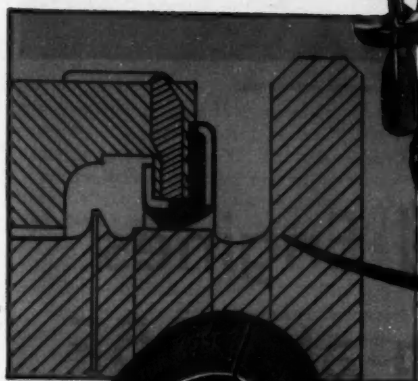
6363 PLYMOUTH AVE., ST. LOUIS 14, MO., U. S. A.
(Branches in Principal Cities and in Canada)

LOCKHEED HYDRAULIC BRAKE PARTS and FLUID . . . NoRoL . . . CoMax BRAKE LINING . . . AIR BRAKES . . . TACHOGRAPHS . . . ELECTRIC MOTORS . . . TRANSFORMERS . . . INDUSTRIAL BRAKES





**SEALED TO ORDER
BY VICTOR**



CRANKSHAFT SEALING AT ITS BEST — WITH VICTOR

Pioneered and patented by Victor, this 2-piece Split Seal design, by actual test, outperforms all other sealing methods—with greatest economy. It simplifies installation; eliminates tapping and bolting operations. Made to last for normal engine life, yet can be replaced on the engine quickly and economically.



Why NASH Engineers Prefer this Improved Rear Bearing Sealing Method

Nash engineers weren't satisfied with old standards for sealing the rear crankshaft bearing. They wanted sealing performance abreast of modern engine requirements. They wanted extra dependability . . . economy . . . simplified installation . . . longer service life. And they found it in *Victor 2-piece Split Seal Design*—the outstanding development for positive oil retention at this vital engine point.

Sealed by VICTOR means satisfaction

The Split Seal Principle is but one of Victor's continuing achievements in automotive sealing since 1909. For all such applications, Victor offers the pioneer's skill and the leading facilities for designing and producing oil seals to your specifications—and complete satisfaction!

Where can we help you to better sealing?

Victor Manufacturing & Gasket Co., and its affiliate, Victor Sealing Products Co., Inc., P. O. Box 1333, Chicago 90, Ill.

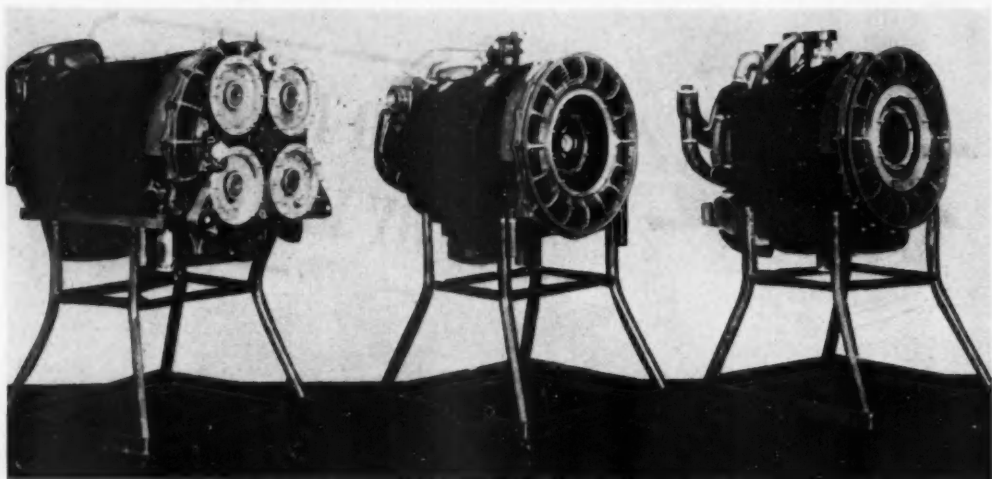


VICTOR

"ORIGINAL EQUIPMENT"

Gaskets and Oil Seals

SEALING PRODUCTS EXCLUSIVELY



Three of the six new engines developed for Army Air Force ground installations.

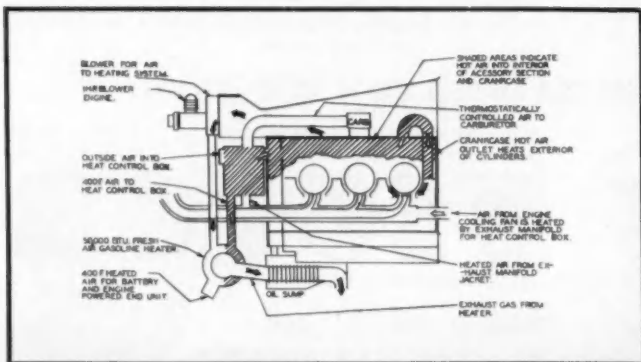
New Aircooled Engines Feature Starting at -65°F

CONTINENTAL MOTORS CORP., Muskegon, Mich., has announced the development of a line of aircooled engines which are designed to start at temperatures down to -65°F . Some of the new units

are already being used by the Army Air Force in a wide range of ground installations.

The new line, known as the Packette series, includes five horizontally-opposed models and one single-cylinder model. All are military adaptations of certain models in Continental's standard line of airplane engines, and range from 15 to 250 hp. The horizontally-opposed units are built with two, four, six and eight cylinders. Two four-cylinder and one six-cylinder model are now in production.

The engines are pre-warmed for starting at extremely low temperatures by a self-contained, gasoline-burning heat-



Packette heating system for sub-zero starting.

Packette Engine Specifications

Model	No. of cyl	Bore (in.)	Stroke (in.)	Displ. (cu in.)	Comp. ratio	Approx. hp at 2400 rpm**	Weight (dry complete)	Fuel octane (min.)	Spec. fuel cons. ** lb/bhp/hr std. 131 F	Oil cons. (av.) lb/bhp/hr std. 131 F
PC15	1	4.062	3.875	50	7-1	15	247	80	.65-.75	.013
PC30	2	4.062	3.875	100	7-1	30	271	80	.61-.69	.013
PC60	4	4.062	3.875	201	7-1	70	473	80	.575-.650	.015
PE90	4	5.00	4.00	314	7-1	110	560	80	.575-.650	.015
PE150	6	5.00	4.00	471	7-1	170	696	80	.575-.650	.015
PE200	8	5.00	4.00	628	7-1	*220	815	80	.575-.650	.015

* 250 hp at approximately 2750 rpm.

** Full throttle.

ing system. During this warm-up, a blower circulates fresh air through the heater, where its temperature is raised to 400 F. The heated air is directed into the accessory case, and then through the interior of the crankcase, where it warms the bearings. It is forced out of the crankcase into the lower shroud to flow around the exterior of the cylinders to the upper shroud, whence it returns to the blower inlet and is re-circulated.

Exhaust gases from the heater flow from the combustion chamber through an oil sump heat exchanger to heat the oil around the suction tube inlet and throughout the sump. As soon as the lubricating oil in the sump has been raised to a temperature of 0 F, a solenoid opens the valve in the mixing housing which provides heated air for entrance into the carburetor air intake.

When the engine is started, engine oil pressure closes the valves at the accessory case inlet and the outlet from the crankcase. The heater and blower continue to operate until the temperature of the air inside the exhaust manifold jacket reaches 100 F. The valve from the heater to the carburetor air-

mixing valve then closes automatically and the heater and blower are turned off. Heated air from the exhaust jacket is blended with the cold air in the carburetor air inlet mixing valve to obtain approximately 60 F air for the engine's requirements.

A feature of the new engines is a load-sensing governor which permits the engine to run at a predetermined low speed under no-load conditions, and causes the engine speed to increase automatically as additional load is applied, up to maximum horsepower. When the load decreases, the governor automatically reduces engine speed. The governor, which operates in accordance with speed changes and venturi pressure, is said to be the first ever developed to operate on this principle. A manual means is provided for locking the governor at any desired speed setting from 1500 rpm to 3200 rpm for loads requiring constant speed.

The Packette engines are of extremely light aircraft-type construction. They are capable of running at full rated power continuously, although operation at 75 per cent of rated power is recommended by Continental for maximum engine life.

SAE West Coast Meeting

A WIDE variety of subjects pertaining to Diesel engines, trucks, fuel, lubricants, transportation and maintenance were discussed by both Canadian and American automotive engineers at the SAE National West Coast Meeting held last month

in Seattle. Because of the timeliness of the subject, Colonel William A. Call read a paper, "Military Wheeled Transport Vehicle Requirements," which he had given previously at the SAE Summer Meeting (AUTOMOTIVE INDUSTRIES, July 1). Presented here are

portions of two of the numerous technical papers read at the West Coast assembly.

By N. M. Reiners
and W. D. Schwab

Cummins Engine Co., Inc.

BASED on the known fact that turbochargers offered an attractive means of improving the fuel economy and increasing the maximum power output of a Diesel engine, and the fact that the mechanical design of the machine has advanced to the point (Turn to page 134, please)

Small Gas Turbine That May Be Started

By **A. D. Zakarian**

Project Engineer, Solar Aircraft Co.

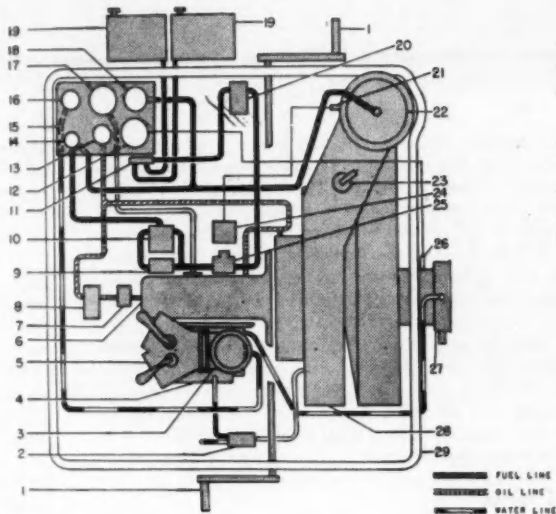
and

Roy R. Peterson

Bureau of Ships, Dept. of the Navy

WITH the advent of the gas turbine as a prime mover, it is increasingly evident that units of low power output can be used to advantage in applications formerly considered beyond their scope. Where the inherent advantages of the gas turbine engine outweigh the moderate thermal efficiency loss attendant on scale reduction, a small gas turbine can be applied with major gains. A simple cycle turbine scaled down to an output as low as 50 shaft hp still gives a weight-to-power ratio considerably better than a comparable reciprocating engine. It can operate on low-cost and less flammable Diesel fuel, and has reliable starting characteristics at low ambient temperature. There are fewer parts in a gas turbine than in a reciprocating engine, and hence the maintenance and serviceability are correspondingly simple. These facts, especially the weight-power ratio, led the Navy Department to consider such a power plant to drive a 500 gpm portable fire pump for shipboard use in place of the pumps now employed, which are driven by four-cylinder, two-stroke gasoline engines.

By 1948 the intensive development and improvements in gas turbine design and the widespread service experience gained in aircraft applications indicated that an acceptable operating life could be expected from the small gas turbine power plant under consideration. Consequently, competitive proposals were requested by the Navy, and contracts were awarded by the Bureau of Ships for prototype units

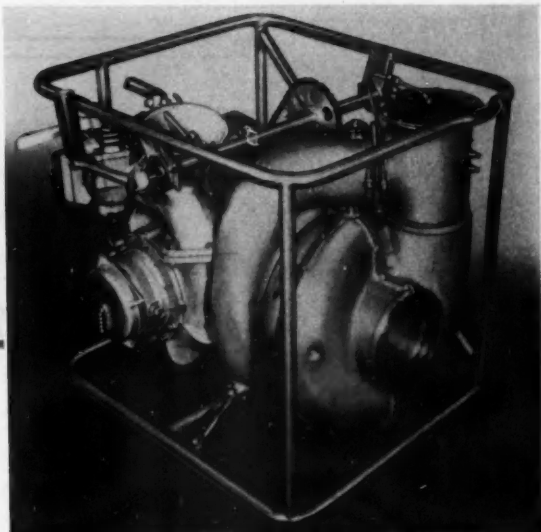
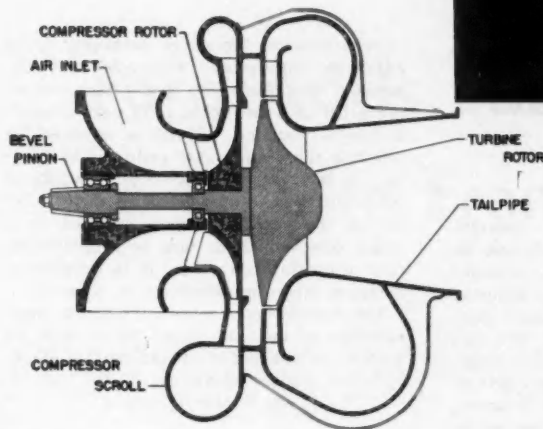


for test. One of the contracts was given to Solar Aircraft Co. of San Diego, Calif., which designed and produced a power plant identified as the Solar Model T-45 portable gas turbine driven pump. The prototype pump set was delivered in June 1950 for evaluation tests at the Naval Engineering Experiment Station, Annapolis, Md. It is the purpose of this paper to discuss the mechanical construction, performance, and field of application of the Model T-45 prime mover.

Design Requirements

The contract under which the Solar Model T-45 unit was produced had as a basic requirement that the prime mover be designed to drive a centrifugal water pump of the same rating as the pump used on the Navy's original Type P-500 portable water pump set. This

by Hand



(Above)—Closeup of the T-45 portable gas turbine driven pump with fuel tanks and instrument panel removed.

(Near Left) Schematic longitudinal sectional view showing arrangement of rotors, compressor scroll, etc.

(Far Left)—Schematic diagram of the unit. 1—Starter assembly. 2—Primer ejector. 3—Primer elbow. 4—Pump. 5—Y-valve. 6—Gear box. 7—Oil pump. 8—Oil filter. 9—Fuel pump. 10—Governor. 11—Fuel manifold. 12—Exhaust temperature indicator. 13—Oil pressure indicator. 14—Throttle valve. 15—Control panel. 16—Pump discharge pressure indicator. 17—Tachometer indicator. 18—Fuel pressure indicator. 19—Fuel tanks. 20—Fuel filter. 21—Spark plug. 22—Burner assembly. 23—Butterfly valve. 24—Magneto. 25—Overspeed valve. 26—Thermocouple. 27—Exhaust cooler. 28—Turbine. 29—Frame.

rating, with sea water, is: Flow, 500 gpm; Discharge pressure, 100 psig; Suction lift, 16 ft.

With a power plant operating at the normal high speed of a gas turbine, it would appear only logical to design a high speed pump. However, it was found that this suction and flow rate cannot be achieved without cavitation at a pump speed much above 4500 rpm, which is the speed of the original pump. Therefore the original pump with some minor modifications was used, and the power plant was designed to suit.

Although standard ambient temperature for Navy gas turbines is 80 F, it was agreed that design calculations would be based on an ambient temperature of 120 F, to insure rated power under all operating conditions. At the rated flow conditions above, the pump requires an input of 47 hp on the driven shaft. Hand starting was required, and Diesel fuel (Navy Spec-

ification No. 7-0-2e) was specified. A waterproof ignition system of maximum simplicity that would operate reliably without battery or external power was called for.

Basic Arrangement

A single-stage, centrifugal compressor was chosen on account of the limitations on compressor pressure ratio imposed by the hand starting requirement. The influence of size effects, including those of Reynolds Number and leakage, and the necessity for holding weight to a minimum, also influenced this choice. Similar factors, as well as the need for simplicity and low manufacturing costs, dictated the use of a radial inflow turbine.

At first it appeared desirable to construct the compressor and turbine rotors as a single integral part, (Turn to page 67, please)



Torque measuring equipment is mounted on the end of the torque arm. The panel of this double acting, double range device mounts valves and other necessary equipment.

24,000 Hp. Dynamometer for Testing Turbo-Jet Engine

MAJOR components of the most powerful turbo-jet engines now being built can be tested on a 24,000-hp power delivering dynamometer recently installed in the Andrew Willgoos turbine laboratory of Pratt and Whitney Aircraft Division, United Aircraft Corp. The machine is capable of transmitting torque to equipment being tested at any speed from 1210 to 15,072 rpm in either direction of rotation. Magnitude of the torque being transmitted is determined by directly measuring the torque being developed by the dynamometer. Output power can then be established from the magnitude of torque output of the dynamometer and the speed of the output shaft of the speed-increasing gear.

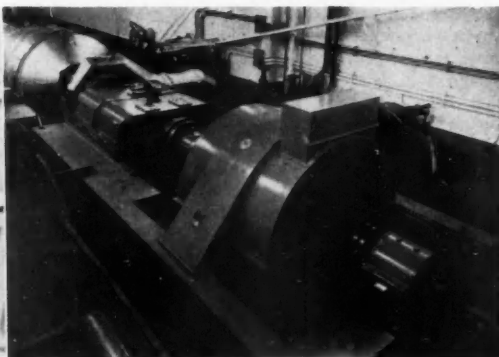
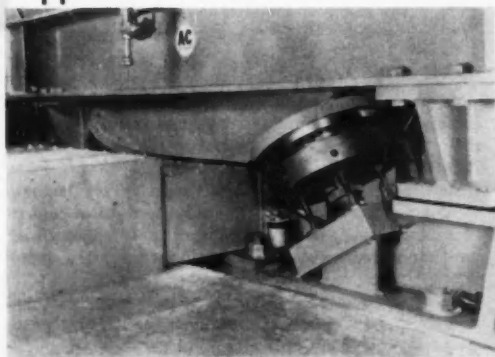
Dynamometer torque is developed by a 24,000-hp, three-phase, 93.3-cycle, 3000-volt, 10-pole Allis-Chalmers synchronous motor connected to a two-speed ratio gear through a flexible coupling. Speed is adjusted by selecting the desired gear ratio and by varying the frequency of the generators supplying power to the synchronous drive motor. By having the motor and gear mounted on a single base, which in turn is supported on four hydrostatic bearings, it is possible to obtain a direct measurement of torque.

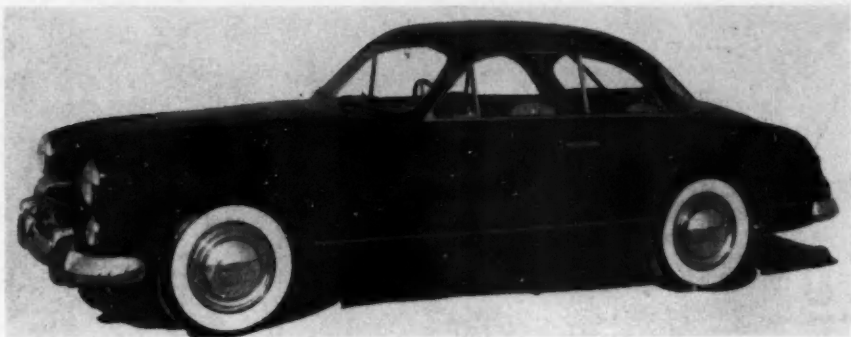
The dynamometer mounting permits measurement of the gear output torque with an accuracy of one-half of one per cent. It allows sufficient angular movement of the unit to

(Turn to page 76, please)

(Lower left) One of four hydrostatic spherical bearings for cradle-mounted dynamometer.

(Below) Cradle mounted, power-delivering dynamometer with Allis-Chalmers 24,000-hp, 3000-volt, three phase synchronous motor; speed increasing gear; and torque measuring equipment.





Side view of the new Ford Comete two-door, four-passenger sedan.

Ford Adds Luxury Model to Line in France

By W. F. Bradley

Special European Correspondent
For AUTOMOTIVE INDUSTRIES

PARIS, FRANCE

FORD has just uncovered and will shortly place in production, in France, a new model designated Comete. Mechanically it has all the characteristics of the present eight-cylinder Vedette, but in lines and body construction it is entirely distinctive. It will sell at \$3943 compared with \$2400 for the standard Vedette.

Standard Ford Vedette chassis are turned over to the Facel-Metallon Co. which builds and installs two-door, four-passenger all-metal bodies designed by Farina of Turin. Except for the installation of a different radiator and special air ducts, no mechanical changes are made at Facel-Metallon.

While the chassis height is the same, the center of gravity has been lowered by making the floor of the car lower than the frame side rails. Overall height is 56 in. The body, composed of six main stamp-

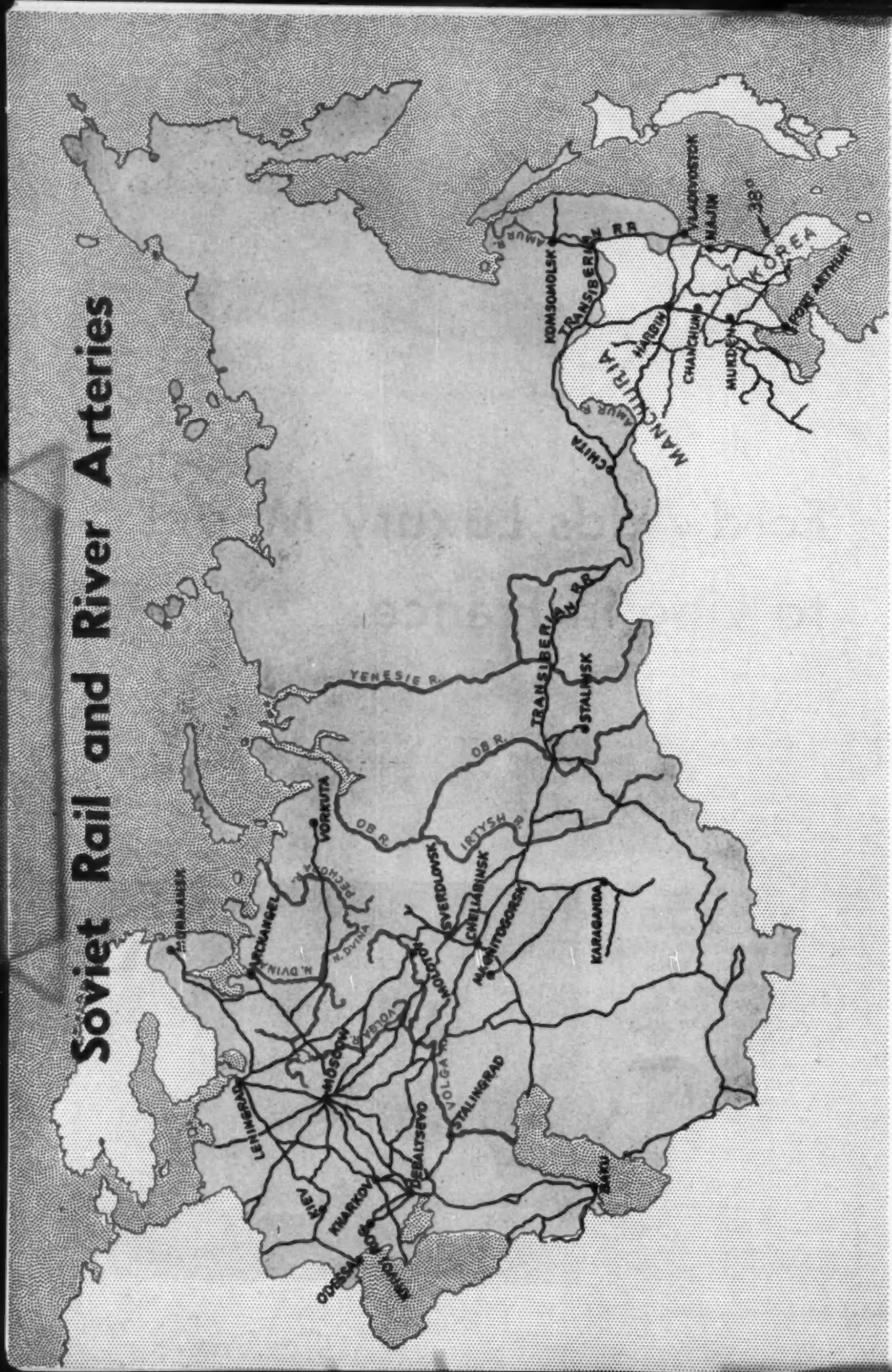
ings, is welded into a unit and welded to the side rails.

Parking lamps are located in guards on the stainless steel front bumper, and headlamps are recessed in the
(Turn to page 120, please)



Front view of the new Ford Comete sedan. Its overall height is 56 in.

Soviet Rail and River Arteries



TRANSPORT . . .

Russia's Achilles' Heel?

By Holland Hunter

Assistant Professor of Economics, Haverford College

Authoritative Facts Are Presented Here on the Strengths and Weaknesses of This Segment of the Soviet Economy in Peace and for War. Handicaps of Operating Such a Vast Transportation System under Nationalization Are Revealed by This Analysis. Map on Opposite Page Shows Rail Lines in Black and Rivers in Red.

IT used to be said, before World War II, that Russia lost wars because her transportation system broke down. This was true in the first World War, and was partly true for the Russo-Japanese war and the Crimean war. Observers everywhere expected the weak Soviet transportation system to collapse under the pressure of the Nazi invasion. Yet somehow it did not. Does this mean that transportation is no longer a weak link in Russia's defenses? What have the Soviet leaders learned about the role of transportation in wartime?

And what have the Soviet leaders learned about transport's place in industrial development? Unless World War III breaks out in the near future, the crucial questions in assessing the Soviet position will relate to her rate of growth and her changing industrial structure. In one prewar period, transportation was a bottleneck which threatened to bring the whole economy to a standstill. Will this happen again?

There is one school of observers who see transportation as the Soviet Achilles' heel, limiting both her peacetime expansion and her wartime strength.

Another school finds that the evidence of recent years considerably modifies this position. It would be imprudent to overestimate Soviet transportation limitations, if in fact they cannot be counted on to hamstring Soviet power. Let us therefore survey briefly the main features of the record, to the extent that information is available.

It should be pointed out first of all that much more information is available than is commonly supposed. The Soviet government has not suppressed all economic reporting, especially when

the news is favorable. It appears in unwieldy form, but patient compilation can yield considerable results.

In the following discussion, no attempt is made to provide detailed data. Since the present and future state of Soviet transportation depends mainly on governmental policy, we must begin by considering Soviet transport policy in general. Over the last two decades, the USSR has sought four objectives in transportation: (1) to minimize the need for transportation, (2) to off-load the railroads, (3) to create a unified transport system, and (4) to maximize the per-

"THE essence of Soviet transportation policy has been an attempt to minimize the need for transportation. The attention of the government has been concentrated on building up heavy industry . . . In one prewar period, transportation was a bottleneck which threatened to bring the whole (Russian) economy to a standstill. Will this happen again?"—Hunter.

WRONG TARGET

In this analysis of Russian transport Mr. Hunter brings into sharp focus much significant information, the import of which is increased by the current international situation, particularly as to assessing the capabilities of the Soviet transportation system to meet the requirements of a full scale war and the extent of its vulnerability. This brings up the question as to what was accomplished by the bombing of Germany during World War II, which was discussed in the article, "Wrong Target," by Colonel S. R. Shaw, USMC, in the March-April 1951 issue of *Ordnance* magazine. It was based on a study of the U. S. Strategic Bombing Survey and here are some of the striking conclusions reached by Colonel Shaw:

"The Allied strategic air forces were misused in the Second World War. The manner of their use violated five of the generally accepted principles of war. . . .

"The tremendous expenditure of planes, men, and gasoline in order to drop one and a half million tons of bombs on German industry was misdirected. Far from destroying the enemy's morale and reducing his war production, it spurred him on to ever-higher levels of production. . . .

"The attack on transportation was the decisive blow and completely disorganized the German economy. . . ."

"Transport—Russia's Achilles' Heel?" presents many facts that bear on this military problem. Mr. Hunter, the author, has concentrated on analyzing Soviet transport operations during the past four years and has prepared several monographs for specialists in the Russian field. Before joining the Haverford College staff, he was associated with the Russian Research Center at Harvard University. The map *Soviet Rail and River Arteries* on the first page was prepared from Russian maps.—Ed.

TRANSPORT . . .

formance of all carriers. Each is discussed in turn. Then some basic transportation problems which have shaped Soviet policy are touched on. With this background, there follows a discussion of the postwar programs which have brought the Soviet transportation system to its present state. The survey ends with a few tentative conclusions.

Minimizing the Need for Transportation

The essence of the Soviet's transportation policy has been an attempt to minimize the need for transportation. The attention of the government has been concentrated on building up heavy industry, and although it is now realized that this requires adequate transport facilities, the policymakers seem to begrudge the diversion of resources and labor into a sector of the economy which contribution is somehow less tangible and "productive" than that of, say, the machine tool industry. Heavy industry is important both as a base for producing consumer goods, and for national defense. The latter has of course dominated the former for many years. This has meant that only the transport needs of heavy industry and the Red Army have had high priority during the forced drive for industrialization which began in 1928.

There is thus a striking contrast between the role of transportation in Soviet industrialization and its role in earlier instances of the same historical process. In this country during the 19th century, in England, France, and Germany, and for that matter in Tsarist Russia before the first World War, railroads were the bell-wether of the whole movement. Transport was the largest customer of the steel industry and stimulated its expansion. Even in recent times, a very large share of capital formation in the West has been devoted to transport, in the form of highways, air transport facilities, and pipelines. In the USSR since 1928, on the other hand, the transport sector of the economy has been expanded only to the extent that it had to be. Its share of the rapidly-growing total stock of plant and equipment has steadily decreased. The Soviet steel in-

Russia's Achilles' Heel? (Continued)

dustry has not needed the railroads as a customer. The Soviets had inherited a considerable network, and were not starting from scratch. Consequently railroads have not been the center of the industrialization process in the USSR.

The years of forced industrialization began with the government's gross underestimation of the need for transportation. In 1933-1935 there was a severe transport crisis. It was met in a way which will be described below. But the demand for transportation continued to grow, and in 1939 the government devised a new policy for meeting it—regional self-sufficiency. For an American transportation executive, used to finding ways of meeting demand with increased supply, and even of stimulating new demand, the implications of this Soviet policy are shocking.

Imagine urging your clients to reduce their demands on you! This is what Soviet railroads have done, with strong backing from the government. Shippers all over the country are urged to get their supplies from the nearest source, and to distribute their output to nearby customers. Going further, producers are urged to avoid over-specialization, to widen their product mix, and to build small rather than large installations. In the interests of reduced interregional freight traffic, industry in general is asked to forego the economies of large-scale production. Strong pressure has been brought by the government to reduce long-haul traffic and eliminate cross-hauls, even where the effect is to complicate the problems of many producers.

Regional Self-Sufficiency

Fundamentally, the government has turned from a line of development taking advantage of geographic division of labor toward a line of development emphasizing well-rounded and unspecialized growth in every part of the country. Obviously it is impossible to establish a complete range of economic activity in each region of the USSR, since their natural endowments are far from uniform. The Soviet emphasis on regional self-sufficiency does not mean, therefore, that it has been achieved. There is even some reason to question whether it ever will be. Experience with the use of low-grade, high-cost local resources has been one of the factors leading to continuation of a large volume of long-haul traffic. The savings in transport which come from using local resources may be entirely offset by high costs of production if the policy is carried too far.

There are, of course, other reasons for the regional self-sufficiency drive. If the USSR can become a collection of relatively independent economic areas, it

will be less vulnerable to invasion. If industrial capacity can be dispersed, the threat of strategic bombing will be mitigated. Finally, the campaign exhorting industry to develop local sources of supply and ancillary lines of production around each major industrial center may be seen as an administrative device to spur rapid accomplishment of the filling-out of new regions which would come about naturally with the passage of time. In any case, the individual transport executive has for twelve years been in the position of fending off demands for his service.

Holding transportation to a minimum has also led to neglect of passenger transportation. Travel as such is a consumer's item, and has low priority in the USSR. Suburban transportation of workers is an exception, of course, and has been greatly expanded. However, the accounts of visitors to the USSR and the descriptions in Soviet literature combine to indicate very poor conditions in long-distance passenger transportation. Soviet carriers are not forced to maintain routes and schedules for the passenger's convenience, even if operated at a loss, as is true in the United States. Railroad passenger rates are set to cover costs and yield a profit. This striking contrast with American conditions is only a specific application of the contrast in objectives between the two economies; in the USSR the consumer is squeezed to promote industry, while here consumers are served even at a loss to the carriers. (Continued, next page)

"SOVIET railroads carry a larger share of total domestic freight traffic than U. S. railroads have for some decades. . . . In Russia the railroads have eaten into the share of river carriers since the first World War, while pipeline, air, and highway transport are still only in an early stage of development. The general picture somewhat resembles the situation in this country around the turn of the century."—Hunter.

TRANSPORT . . . Russia's Achilles'

Last but not least, the government has sought to check the demand for transportation in order to keep some transport capacity in reserve for military purposes. Reserves of all kinds stood the USSR in good stead during 1941-1943, and the postwar Five-Year Plan made specific provisions for rebuilding reserves in every field. It was hoped, for example, that less than half the new freight cars to be built during 1946-1950 would be placed in service, leaving the balance for a reserve stock. In practice, it has been difficult to set aside any appreciable reserve capacity in a continuous situation of straining to meet output targets which tax existing capacity to the limit and beyond. Here again there is a noticeable contrast with the United States. In this country we have a considerable margin of output which in time of war could be curtailed as non-essential, freeing capacity for military use. In the USSR, non-essentials have been stripped away for years, and hence this source of reserves is lacking.

Off-Loading the Railroads

Soviet railroads carry a larger share of total domestic freight traffic than U. S. railroads have for some decades. In 1950 Soviet railroads produced 85 per cent of the total Soviet domestic ton-miles while in the United States railroads last year produced 49

"THE essential weakness of the Soviet transportation system lies in its thinness. By comparison with Germany or the United States, for example, there are few alternative routes, among different carriers, between important points in the USSR. This is so obvious that it leads easily to the concept of hamstringing the Soviet Union by cutting a few crucial tendons. However, there is a false security in this notion."—Hunter.

per cent of our total domestic freight traffic. In Russia the railroads have eaten into the share of river carriers since the first World War, while pipeline, air, and highway transport are still only in an early stage of development. The general picture somewhat resembles the situation in this country around the turn of the century.

An American transport executive would be greatly struck by the deliberate Soviet policy of transferring traffic from the railroads to other carriers. In the United States, of course, the process has been a painful one for the railroads, and has given rise to serious issues of public policy. In the USSR, the hard-pressed railroads need not object if a portion of the demands on them can be shifted to trucks, pipelines, or barges. With demand growing more rapidly than capacity, no carrier need fear an absolute fall in traffic; the government merely seeks to raise the output of the smaller carriers more rapidly than the output of the railroads.

This government pressure to off-load the railroads has meant that the Five-Year Plan targets for water, road, air, and pipeline traffic have been set high, while the targets for rail traffic have anticipated a less rapid rate of growth. In practice, the former targets have regularly been underfulfilled, while the railroads invariably seem to end up carrying more freight than they were "supposed to." Below, in the section on basic Soviet transport difficulties, some of the reasons for this will be considered. Even though the factors responsible are compelling ones, the fact remains that in planning the division of traffic among the carriers, all four Five-Year Plans have been failures.

The present Soviet transportation system stands at an earlier stage of historical development than does our own. In the coming decades the relative role of Soviet highway, pipeline, and air carriers is bound to increase. However, there are good reasons for predicting that the USSR will not follow the U. S. pattern exactly, and that the railroads' share of total domestic freight traffic in the USSR will remain at least two-thirds for many years to come.

Coordinating the Carriers

A third element in Soviet transport policy is the objective of creating a "unified transport system," in which planning will eliminate the competitive duplication said to characterize capitalist transportation. Since the fundamental realities of transport activity grow out of technology rather than politics, it is interesting to examine Soviet experience on this point,

Heel? (Continued)

to see how well coordinated the work of the various carriers actually is.

In recent years, great stress has been laid on shifting short-haul traffic to trucks. The railroads point out that short-haul traffic is very costly for them, and uses equipment inefficiently. They have regularly prodded both their clients and trucking organizations to relieve the railroads of short-haul traffic, especially within major industrial cities. This in fact is the primary role of trucking at the present time, along with the job of bringing farm output to railheads, and various chores at construction sites. The average length of haul for Soviet truck traffic is only around ten miles; obviously there is as yet very little inter-city highway traffic. Even with the extremely rapid growth of trucking which has taken place since the war, the railroads still account for about half the freight ton-miles moved for distances up to 30 miles. Clearly this problem has yet to be solved.

Water Transportation Seasonable

Coordination of rail and water carriers is made difficult by the highly seasonal features of water transportation under Soviet climatic conditions. The government strives for continuous, year-round production in industry, which leads shippers to demand continuous performance. River and sea carriers have very low costs, but their clients will have off-setting storage costs to bear if they accumulate stocks to cover the freezing period each year. Furthermore, industrial enterprises, being under great pressure to meet short-run production targets, are vitally interested in speedy delivery of all their inputs, and this militates against the water carriers.

For these reasons, it has proved difficult to increase the volume of river freight traffic. There has even been a tendency for traffic in petroleum, timber, and grain which before the first World War moved by water, to be transferred to the railroads, and the average length of haul on rivers has steadily decreased. It also appears that the allocation of personnel, equipment, and supplies to river transport has been somewhat niggardly, making it difficult for these organizations to respond to the government's exhortations.

Coastal maritime transport suffers under the same limitations, and with the volume of foreign trade much reduced since the early 1930's, sea traffic has been rather small. The seas cannot contribute very effectively to domestic freight traffic, since they are separated from each other by whole continents. Canals can remedy the situation in part, and several current

Three Articles on Soviet Economy

"TRANSPORT — Russia's Achilles' Heel?" is the third of a series of articles presented by AUTOMOTIVE INDUSTRIES on the Soviet economy. The first two of these articles, "The Automobile Industry That's Behind the Iron Curtain," published in the Feb. 1, Feb. 15 and March 1, 1948 issues, and "What Is Russia's Industrial Strength?" in the Aug. 1 and Aug. 15, 1950 issues, were prepared by Demitri B. Shimkin, a member of the staff of the Russian Research Center at Harvard University, who also is Consulting Editor on Russian Industrial Affairs for AUTOMOTIVE INDUSTRIES. Both of them attracted world-wide attention, extracts from which were published in many newspapers, broadcast over radio networks, and translated into foreign languages.

projects will have this result, but the USSR can never duplicate the favorable coastwise shipping conditions of the United States.

In recent years, efforts have been made to adjust the structure of freight rates so that where rail and river or sea routes are alternatives, the rates will favor water carriers (not always the case in the past). Heavy emphasis has also been laid on improving trans-shipment facilities to stimulate rail-water shipments. Soviet statements make it appear, however, that much remains to be done.

Finally, there is evidence that since the various forms of transport are operated by separate organizations, coordination of their work meets "red-tape" problems. A shipper may forego the savings obtainable from using a rail-water route, for example, if bills-of-lading, etc., are appreciably simplified through using an all-rail route. Here it appears that there are certain underlying problems connected with operating a complex, industrial economy which no change in political slogans can overcome.

(Turn to page 82, please)

Industrial Truck System At Bendix Aviation Plant

MATERIAL in a wide range of sizes, with some of it in unit loads of 1000 to 2000 lb, is handled by means of powered industrial trucks at the Eclipse-Pioneer Division of Bendix Aviation Corp., Teterboro, N. J. This plant covers more than 724,000 sq ft, including the aluminum and magnesium foundries. It is the second largest of fourteen Bendix Aviation Corp. Divisions and produces instruments and accessory equipment for the Air Force, the Navy and for commercial airlines both in this country and abroad.

So far as possible various departments of the plant are arranged to secure a straight-line flow of work between the receiving and raw-stock departments at one end of the plant's main building, and the assembly and shipping departments at the other, a distance of approximately one-eighth of a mile. It is within the production area that most use is made of the plant's fleet of powered industrial trucks. These, for the most part, are of the platform type, there being eight lowlift platform, and four highlift platform trucks, with a powered hand truck of the

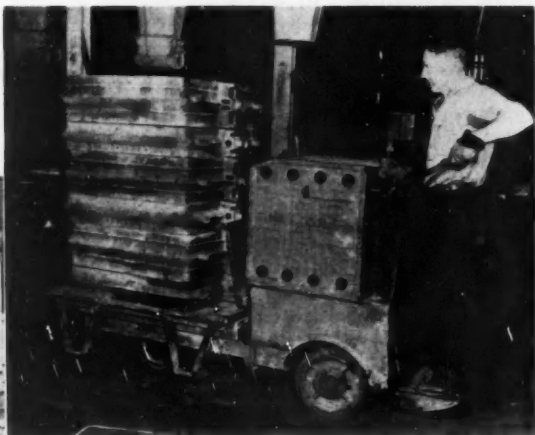
fork type with telescopic lift being used in the shipping department for handling material on pallets. The platform trucks are used to handle skid-loads and, at times, to act as tractors to pull trains of trailers.

Powered trucks are used also in the plant's aluminum and magnesium foundries located adjacent to, but separate from, the production plant. Both metals are received in car lots by rail in pigs. The aluminum and magnesium are stacked on skids in a storage yard alongside the foundry and delivered to the melting furnaces by the powered platform trucks as needed. There are three highlift and two lowlift platform powered trucks used in the foundries. Most of the material—with the exception of sand and cores which

(Turn to page 76, please)



(Above) Casting flasks are moved to the molding floor by means of powered industrial trucks of the lowlift platform type.



(Left) A 1200-lb load of shipping cases, contained on a single pallet, is being removed from the shipping department for placement inside a highway trailer truck.

Britain's Nationalized Transport Operated at Huge Loss and Leaves Trail of Widespread Discontent

NATIONALIZED truck transport in Britain showed a deficit of \$3,098,132 on last year's operations and left a trail of discontent among all except those who cling to the political belief that the State can handle everything better than private enterprise.

This loss is a part of the £39,480,000 deficit shown by the whole of the nationalized transport services in Britain for 1950, the accumulated deficit of which amounts to £110,880,000. Before road haulage was nationalized it was in the hands of a large number of small firms, of which 85 per cent did not use more than five vehicles apiece. These firms made money, or they had to get out of business. The nationalized organization loses money and remains in business.

The trucking business took shape soon after World War I, when large numbers of ex-soldiers bought used trucks and set themselves up in business in a small way. Fifty per cent of them lost money and failed to continue. Then the movement grew to such an extent that the government decided, in 1933, to issue licenses for carrying goods for hire or reward. Until nationalization there were 20,000 holders of an "A" license (full time haulers) operating a total of 86,000 vehicles. A "B" license was for those engaged partly in haulage work and partly in the carriage of their own goods in connection with businesses owned by them. There were about 53,000 vehicles in this class. The "C" license gave the holder the right to carry his own goods only, and obtaining it was a mere formality.

Official Alibis for Deficits

Causes put forward officially to explain last year's deficit are delay in applying the increase of 7½ per cent in trucking rates and not adopting the necessary 10 per cent increase; successive increases in the cost of fuel, tires and wages; opposition from shippers who refused to accept the increased rates; the disappearance of important clients who were not prepared to transfer their business from private ownership to State management; and abnormal maintenance.

The Transport Act of 1947 provided for the setting up of the British Transport Commission, and was

By W. F. Bradley

Special European Correspondent
for AUTOMOTIVE INDUSTRIES

followed shortly after by complete nationalization of railways and canals. By a gradual progress which has just reached its completion, long distance trucking was nationalized. This represented about a quarter of the national trucking industry. Something like

3000 firms operating 38,500 vehicles, were acquired by compulsion during 1948-1949. So-called "original permits," carrying the right to compensation if they were revoked, were renewed a year ago to only 11,000 out of 17,500 applicants. Near the end of last year there was a further cut, so that at the present time only 3800 permits are in use, and these appear to apply to relatively unimportant traffic.

Long Distance Hauling—a Monopoly

Thus, at the present time, the State has a practical monopoly of long-distance haulage, for those who are left are limited to a radius of 25 miles from their base, unless they hold a permit from their nationalized competitor, or use their vehicles only for bulk liquids, indivisible loads, furniture removals, livestock, meat, round timber and explosives.

Official figures covering the setup of the trucking industry before the war, before nationalization and two years ago, are as follows:

	Number of Vehicles		
	1938	1946	1949
Private enterprise "A" and "B" licenses	148,000	149,000	129,000
Private enterprise "C" licenses	365,000	384,000	672,000
State owned			34,894

At the end of last year the State owned and operated 40,000 trucks and a much smaller number of coaches. Privately owned trucks, operating under "C" licenses, have increased to 750,000. The State body, known as the Road Haulage Executive, can operate without licenses, but has the privilege of opposing the granting of licenses to private firms.

One effect of nationalization has been to enormously increase the number of holders of a "C" license. The holder of such a license is placed under no restriction providing he is carrying only his own goods. If he

(Turn to page 140, please)



New Vauxhall six-cyl Velox. The same body and chassis are used for the four-cyl Wyvern.

Vauxhall Announces New

LUTON, ENGLAND

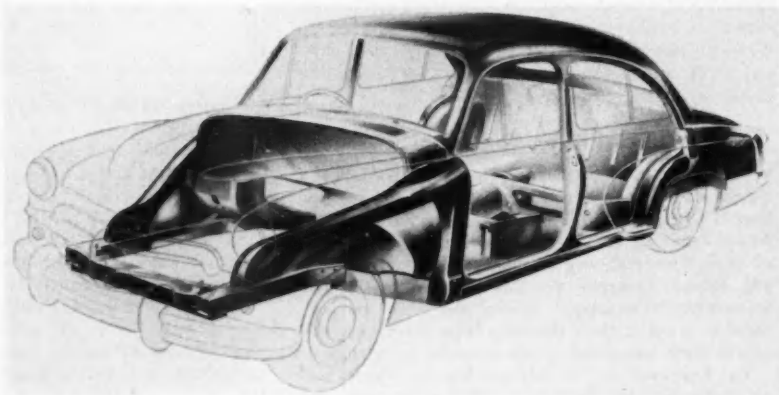
CONTINUING its general policy of one body style and one chassis with either a six or four-cylinder engine, Vauxhall Motors, Ltd. (under General Motors control) announces important changes for its 1952 line. The cars have been made larger by increasing the wheelbase by $5\frac{1}{4}$ in., making it now 103 in., and by widening the tread three in. at the front and $4\frac{1}{2}$ in. at the rear. With the new flush-sided body, this gives greater width to both front and rear seats. The engine is carried farther forward, allow-

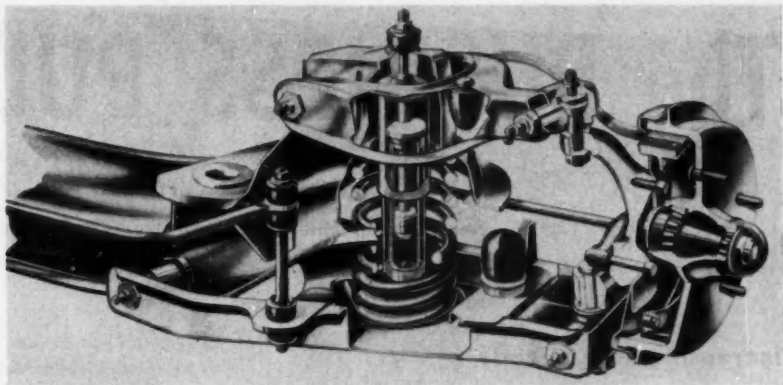
ing the rear seat to be ahead of the wheel housings and giving greater leg room.

The body is single unit steel construction, with the forward extension which carries the engine as an integral part of the shell. Weight has not been increased by more than a few pounds.

Front suspension is now by coil springs with long and short support arms, and the cross member which carries them is bolted directly to the forward extension of the body. A double-acting, sealed shock absorber is mounted within each coil spring, and a

Phantom view showing integral body and frame construction of the new Vauxhalls.





Front suspension support arms are mounted on a cross member which is bolted to the front body extension.

Cars for 1952

By W. F. Bradley

Special European Correspondent
For AUTOMOTIVE INDUSTRIES

stabilizing bar joins the lower arms of the two front suspension units. The rear suspension, also new, is composed of 48-in. semi-elliptic springs with only three leaves of 2¼-in. width. There are four leaves in the springs for export models. Covers are fitted over the rear springs.

A hypoid rear axle is used, with pinion and differential assembly on taper roller bearings. Weight is saved by the use of aluminum for the transmission case, which is extended to provide an outer support for the long mainshaft. This permits the open propeller shaft to be shorter and stiffer. The turning circle has been reduced to less than 35 ft, despite the lengthened wheelbase.

Body lines have been considerably modified. The body continues the line of the front fenders, but the side view is relieved by a well-placed change of contour extending through the doors to the rear fender. Door hinges are concealed, the hinges being on the forward edge. The windshield is one-piece and well curved.

A new instrument panel of moulded transparent plastic is fitted with two main instruments immediately in front of the driver and seen through the two-spoke steering wheel. Greater space is provided in the trunk, which has a completely flat floor, with tools and jack stored in separate compartments. The spare wheel is on a rigid cradle beneath the floor of the trunk, and can be drawn out beneath the rear bumper.

All bodies are now dipped in a bath of paint primer to a depth of 12 in., thus providing added protection for the lower parts where corrosion first appears. Twenty-two holes are drilled in the body to allow the

paint then to reach all of the many interior surfaces.

Minor changes in the engines are special manifolding and new crank cases. The six-cylinder Velox has a displacement of 138.7 cu in., a compression ratio of 6.75, and develops 58.3 hp at 3500 rpm. The Wyvern four-cylinder has a displacement of 88 cu in., a compression ratio of 6.4 and an output of 35 hp at 3200 rpm. Torque is 106.5 lb-ft at 1100 rpm for the six and 71 lb-ft at 1800 rpm for the four.

• • •

Fluid Hydroformer Converts 55 Octane Naptha to 98-175

THE world's first Fluid hydroformer, currently being engineered by the M. W. Kellogg Co., New York City, will be able to convert 55-octane virgin gasolines into 98-175 octane aviation gasoline, according to an announcement by Kellogg. The plant, a 2000-barrel-per-day unit, is to be located at the Destrehan, La., refinery of the Pan-Am Southern Corp. Process design has been completed and construction is scheduled to start within the near future.

(Turn to page 144, please)

The BUSINESS PULSE

Outlook Is for Continued Heavy Investment by Business and for Increased Government Purchases. Expenditures for Personal Consumption Are Likely to Increase in Near Future Unless Restrained by Short Supply.

Increasing Retail Trade

The business community has been concerned in recent months by a progressive weakening in demand. The first measurable results were successive price declines and steadily growing inventories. If demand remained pent-up it seemed inevitable that, in time, this would be reflected in levels of production and trade. The effects were first noted clearly in July, when the Federal Reserve Board index of industrial production registered a four per cent decline from the June level and stood at the lowest point since last September. The Guaranty Trust Company's index of business activity dropped by about two per cent in July to the lowest point in a year.

There seems to be a general expectation that business activity in general will not experience a long or sharp decline. Such data, for example, as are available for the last few weeks suggest a moderate recovery from the July level. The Federal Reserve Board forecasts that its index for August will be higher than that for the preceding month but below the average maintained during the first half of the year. Some degree of recovery in retail trade seems already evident. Reports for the last few weeks indicate substantial increases.

The most significant basis of optimistic forecasts stems from analysis of the essential nature of the recent business recession. The official report on national income and product made public in August shows that of the three main divisions of demand—personal, business, and Governmental—only personal demand declined in the second quarter. Business and Government demand both increased. The outlook is for continued heavy investment by business and for a rise in Government purchases of goods and services. Remaining is the question of personal demand, and here, too, most quarters of opinion hold that expenditures for personal consumption are likely to increase in the near future, unless and until restrained by curtailment of supply. Declines in personal buying to date have been purely voluntary, not forced by lower purchasing power or curtailed supply. Personal income in June was at the annual rate of \$251.1 billion, or 15

This Survey Prepared Exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Company of New York.

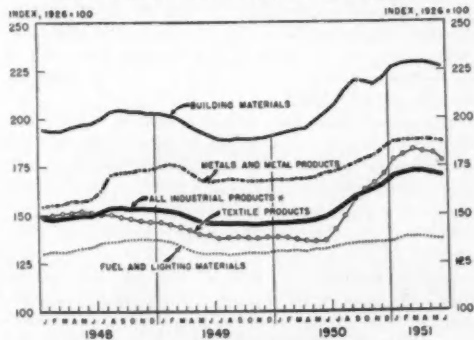
per cent more than it was in June of last year.

Personal savings in the second quarter of this year were, at an annual rate, 9.5 per cent of disposable income, which compares with savings of 4.5 per cent in the same quarter of last year. This indicates that the decline in demand reflected a higher level of savings, not a lower level of income. The percentage of savings

on an annual basis in the second quarter was exceeded only in 1941-45 and part of 1946, when many kinds of personal consumption goods were unobtainable. This fact gives rise to a belief among some economists that the proportion of savings to disposable income in the second quarter was "abnormal" and is not likely to

continue. Other factors of underlying significance as regards personal demand are the estimates of the Bureau of the Census that total civilian employment rose steadily from April through July, and the prospective high levels of disposable personal income.

Wholesale Prices on Industrial Products



*—All commodities other than farm products and foods.
Source: Department of Labor.

Government Purchases Rise

In relation to the demand situation as a whole, it is significant that in the second quarter the decrease in expenditures for personal consumption was more than
(Turn to page 102, please)



Continued high steel production this winter
may depend on . . . **CLEANING OUT**

→ YOUR SCRAP

THIS MONTH

HOW TO TURN SCRAP INTO MONEY
with an organized dormant scrap round-up
in your plant:

1. Appoint a top executive with authority to make decisions to head the salvage drive.
2. Organize a Salvage Committee and include a member from every department.
3. Survey and resurvey your plant for untapped sources of dormant scrap. Encourage your employees to look for miscellaneous scrap and report it to the committee.
4. Sell your entire organization on the need to scrap unusable material and equipment.
5. Prepare a complete inventory of idle material and equipment. Tag everything not in use.
6. Start it back to the steel mills by selling it to your regular scrap dealer.
7. **KEEP AT IT!**

***DORMANT SCRAP** is any obsolete, broken or worn-out and irreparable machinery, tools, equipment, dies, jigs or fixtures, etc., that may encumber your premises.

Despite . . . and because of . . . the continued high rate of steel production, the steel industry is on a hand-to-mouth basis in its receipts of purchased scrap . . . essential to production! Mills that normally inventory a 60 day supply of scrap, are now maintaining high production with less than a week's supply on hand. That the effect of winter on transport facilities could quickly exhaust these dangerously meager scrap inventories . . . and thus force a cut in steel production . . . is obvious. Help assure an uninterrupted steel supply by rounding up and selling your dormant scrap* to your regular scrap dealer this month!



**INLAND
STEEL COMPANY**

38 South Dearborn Street • Chicago 3, Illinois

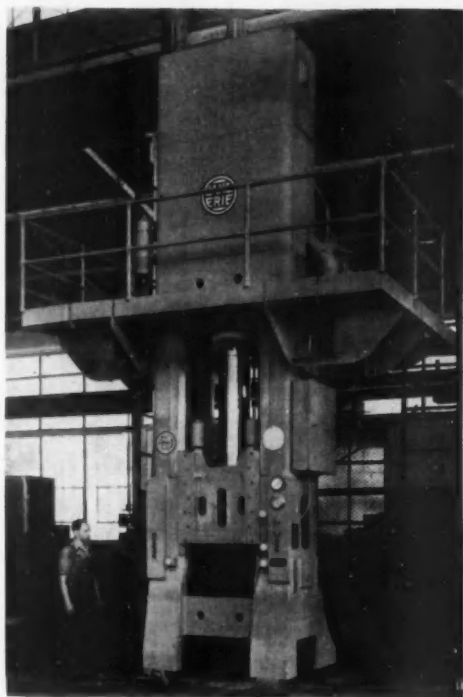


• PRODUCTION • EQUIPMENT • PLANT •

NEW NEW



FOR ADDITIONAL INFORMATION regarding any of these items, please use coupon on PAGE 56



E-45— Hydraulic Press

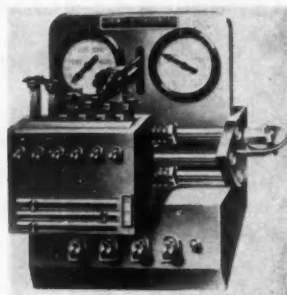
Lake Erie Engineering Corp., Buffalo, N. Y., has recently shipped its first hydraulic press for producing 105 mm cartridge cases, under the current program. This 200-ton press represents many improved details of design over similar units produced by Lake Erie during the last war. It has a bed area of 30 in. by 30 in., daylight opening of 66 in. and 48 in. stroke. It stands 22 ft above the floor and is powered by a 125 hp motor.

E-46—Marform Process Control Unit

The Marform Div., Loewy Construction Co., New York, N. Y., has developed a simplified pressure control mechanism for use with Marform equipment. This mechanism consists of a flexible strip cam which is readily adjustable by turning the friction locking adjustment knobs.

The developed profile on the strip cam determines the magnitude of the rubber pad forming pressure. In addition to the pressure control, the setting of the three sliding indicators deter-

(Turn to page 52, please)



Marform pressure control mechanism.

News of the Machinery Industries

Labor Situation

Although employment in the machine tool industry has more than doubled since the Korean outbreak (AUTOMOTIVE INDUSTRIES, August 15), many manufacturers of machine tools still need labor to meet production schedules. Most of the builders are working on a round-the-clock basis, but others can work only two shifts due to the tight labor market.

Major criticisms are the high pressure techniques used and the handsome offers presented to prospective employees by some defense plants. Such competition has lured even long-time employees away from the machine tool

plants in many instances. In some areas the builders have been able to work out a labor agreement with defense facilities, but in other places the field for labor is highly competitive with no limit on wages. The Government stepped into one case and decided that a new defense plant, which was going into operation, could not raise wage rates above those established in that particular vicinity.

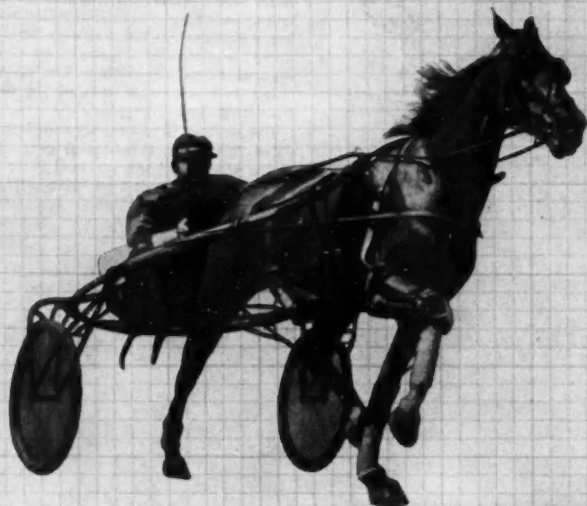
Future Plans

Practically every machine tool maker is thinking about what may happen to the industry when the defense program

slows down or comes to a halt—even though this may take some time. The manufacturers do not want to get caught as they did after WW II. Several producers already have new machine tools lined up to fill their capacity when defense orders cease.

There are a variety of views on what the Government should do with its machine tools when the decision is made that the tooling is no longer vital to the defense effort. Some say that all excess tooling should be given to the Europeans under the Marshall Plan, while others would like to see the equipment placed in storage and mothballed for future emergencies.

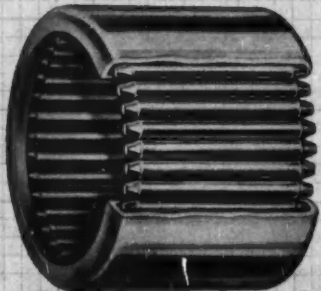
(Turn to page 162, please)



thoroughbreds... for high speed operation

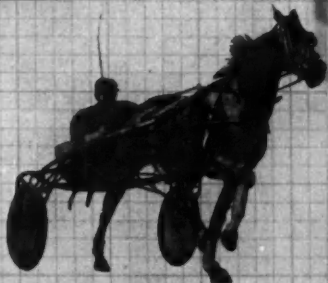
Torrington Needle Bearings are ideally suited for a wide range of operating speeds—5,000...10,000...15,000 rpm and higher. These smooth-running bearings—equally efficient for rotating or oscillating applications—have low coefficients of starting and running friction. Thus, power requirements are reduced.

Other Needle Bearing advantages—high radial load capacity, light weight and compact size—aid in simplifying design as well as increasing efficiency. Why not get full details in terms of your own product? Write today.



THE TORRINGTON COMPANY

Torrington, Conn. • South Bend 21, Ind.
District Offices and Distributors in Principal Cities of
United States and Canada



TORRINGTON *NEEDLE* BEARINGS

NEEDLE • SPHERICAL ROLLER • TAPERED ROLLER • STRAIGHT ROLLER • BALL • NEEDLE ROLLERS

NEW **• PRODUCTION • EQUIPMENT • PLANT •**

For additional information regarding any of these items, please use coupon on page 56

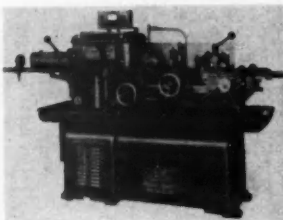
(Continued from page 50)

mines the upper and lower limits of the draw depth, as well as the point at which intense forming pressure is built up for setting radii, shearing, etc.

E-47—Turret Lathe

A model 2-B turret lathe, with 1 1/4 in. bar capacity, utilizing standard assemblies is now being built by Simmons Machine Tool Corp., Albany, N. Y. The lathes are designed for production of precision parts and a variety of bar and chucking operations. They feature remote speed control, helical gears in the headstock, and an electrical tachometer to indicate spindle speed.

Speed change, formerly selected by hand wheel, is now done by push button operation. The electric control permits an infinite range of reversible speeds;



Simmons turret lathe, model 2-B.

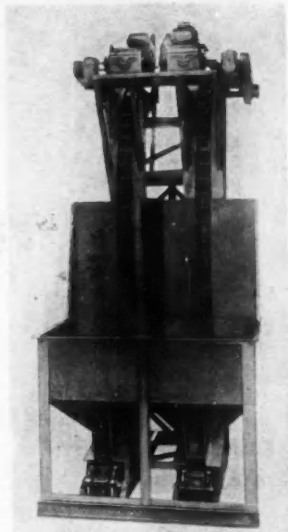
it also incorporates overload protection. Simmons Micro-Speed Drive permits an infinite range of speed changes while the spindle is in operation in either direction.

The spindle is mounted so that opposed anti-friction bearings on the

head end control longitudinal adjustment. A straight precision roller bearing is mounted on the rear end. Spindle drive is obtained through standard, separable-link vee-belt. The spindle clutch is a standard make of the multiple-disk type.

Power feed to the turret ram is provided through a three-speed gear box, and a worm and worm wheel mounted on the turret saddle. A motor-driven coolant pump is standard equipment. An a-c three-hp motor is used to power the lathe.

E-49—Conveyor-Feeder



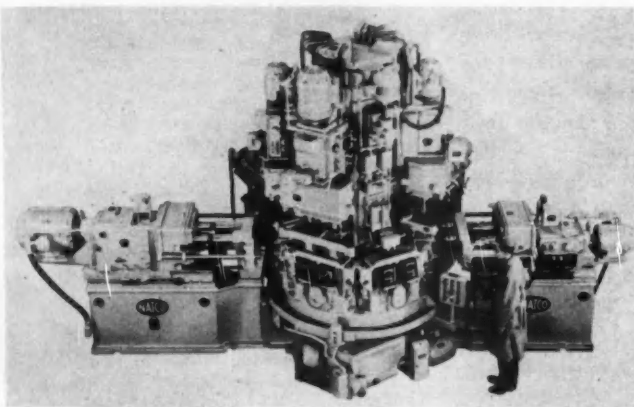
May-Fran continuous conveyor-feeder.

May-Fran Engineering, Inc., Cleveland, Ohio, has added a continuous conveyor-feeder unit to their standard line of materials handling equipment. This feeder unit is for the mechanized handling of small forgings, castings, stampings and machined parts during heat-treating, sand-blasting, washing, cleaning and other processing operations in which mass feeding and handling is necessary.

May-Fran feeder-conveyors are custom fabricated from mass-produced component parts to meet individual requirements relative to size and capacity. Units can be furnished having almost any belt width required. Height of an individual unit is dependent upon intended application, and size of hopper can be varied to meet specific needs. Floor or recessed type hoppers are regularly furnished as specified. Additional features include a variable speed drive which provides for the regulation of parts flow from one processing stage to another.

(Turn to page 54, please)

E-48—Automatic Drilling Machine



A six-position station-type automatic driller has been developed by the National Automatic Tool Co., Richmond, Ind. This machine is capable of performing over 18 operations on 180 cylinder blocks per hour, including drilling holes from 0.9375-in. diam. to 0.0625-in. diam., rough boring, facing, chamfering, milling, rough and finish reaming. The Natco automatic station-type machine has a 65-in. diam. six-position automatic index rotating table. It has a center column with auxiliary horizontal units. The center column is composed of four vertical Natco Holeunits and horizontal units made up of one special milling unit and three horizontal Holeunits. Seven fixed center gear-driven heads contain a total of 52 standard drilling spindles mounted in anti-friction bearings and provided with nose adjustment wherever centers will permit. The special milling head contains two milling spindles.



SILASTIC* can be used to fry an egg or keep aircraft flying under icing conditions

Consider resistance heating elements embedded in Silastic. Among many present and potential applications are: the anti-icing of air intake doors on jet engines; deicing strips for aircraft wings, helicopter blades, and camera mechanisms; electric blankets and soil heaters. Such applications are practical because extreme temperature Silastic stocks are the only rubber-like materials that stay elastic at temperatures ranging from -100 to $+500^{\circ}\text{F}$.

Certain Silastic stocks are also excellent electrical insulating materials. Dielectric strength and dielectric constant are practically unchanged by 4 months of

accelerated aging at 175°C . (347°F). High heat conductivity enables Silastic insulated coils to operate under the same load at temperatures as much as 50% below the temperatures of identical coils impregnated with electrical insulating varnishes.

And remember, Silastic also repels water and ice; shows excellent resistance to oxidation, outdoor weathering, ozone and to a variety of hot oils and chemicals. That's why Silastic is so challenging as a heating pad; so indispensable as a gasketing, sealing and electrical insulating material.

PT. M. REG. U.S. PAT. OFF.

Write Today!

DEPARTMENT C-9

DOW CORNING CORPORATION
MIDLAND, MICHIGAN

ATLANTA • CHICAGO • CLEVELAND • DALLAS • LOS ANGELES • NEW YORK • WASHINGTON, D. C.

In Canada: Fibreglas Canada, Ltd., Toronto • In Great Britain: Midland Silicones, Ltd.

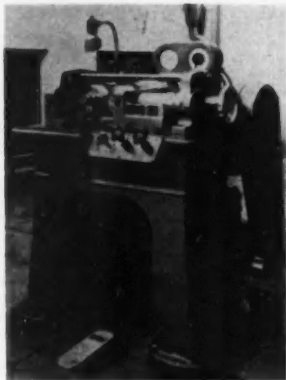


• PRODUCTION • EQUIPMENT • PLANT •

For additional information regarding any of these items, please use coupon on page 56

(Continued from page 52)

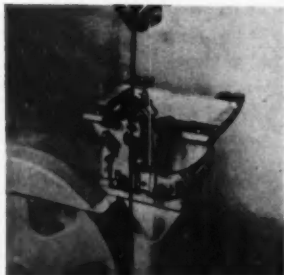
E-50—Thread Rolling Machine



Carl Hirschmann Co., Manhasset, N. Y., U. S. representative for Thommen, S.A., Waldenburg, Switzerland, has announced the Thommen type G-45 thread rolling machine. Designed for handling 120 to 1500 pieces per hour depending on the kind of metal and the size of thread, it cold-rolls chipless threads with polished flanks and exact profiles in standard and special steels, most of the nonferrous metals, and such light metals as aluminum and its alloys. It rolls the threads with left or right hand pitch, multiple pitch threads, threads within centers, very short threads with collars and also conical threads.

E-51—Saw Table Mounting

Announced by Do-ALL Co., Des Plaines, Ill., is a design change in the mounting of saw tables on their con-



DoALL saw table mounting.

tour machine line. This change is said to increase the rigidity, minimize deflection under load and eliminate vibration of the work table and still maintain a universal two-way tilt for angle cutting.

A feature is that the lower saw guides can be raised above the work table surface to give increased support to the blade. The new design employs a semi-steel cradle 5½ in. wide which is bolted and doweled to the steel frame of the machine. A fitted trunnion, also of semi-steel, is bolted to the lower face of the work table and rides in the machined cradle. A locking nut and ratchet type locking lever enable the table to be set securely at any angle up to 45 deg right and 10 deg left.

E-52—Jolt-Squeeze-Strip Molding Machine

Built by SPO, Inc., Cleveland, Ohio, is a jolt-squeeze-strip molding machine for the production of large copes and

drags. Designated model 2364, this machine features centralized control of all operations.

Operating on standard 80 psi, it has a squeeze capacity of 80,000 lb and jolt capacity of 4000 lb. Squeeze cylinder diameter is 36 in., pattern draw 14 in., and squeeze piston stroke 14 in. Flask space ranges from 38 in. minimum to 54 in. maximum, left to right, and from 32 to 50 in., front to back.

The squeeze head is power operated, jolt cycle timer-controlled, and the squeeze cycle regulated by a pressure switch. Two-speed vibrating and stripping operations are automatically controlled.

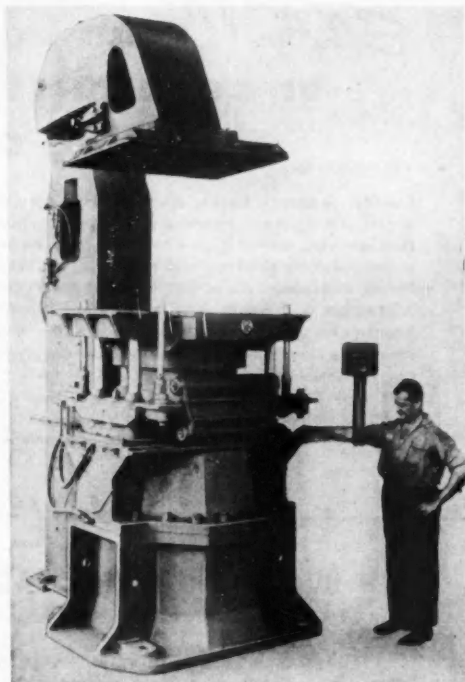
It is designed for recessing 50 in. below floor level and extends 116 in. above. (See picture below.)

E-53—Light Capacity Chain Conveyor

From the Southern Engineering Co., Inc., Burbank, Calif., comes the Chain-Veyor, an innovation in light capacity, power-driven, overhead chain conveyors, in which complicated and fast-wearing parts are said to have been eliminated. Extremely flexible, its short radius curves and track sections are claimed easily combined to make changes or additions quickly.

The Chain-Veyor handles loads up to 30 lbs on each pendant spaced at 6-in.

(Turn to page 60, please)



SPO jolt-squeeze-strip molding machine, 2364



Forever learning

Sealed Air Corporation, Inc. is the leader in the development and production of new and improved piston rings and cylinder sleeves. Our products are designed to provide maximum protection against oil leakage and wear, and to provide maximum protection against dirt and debris. Our products are designed to provide maximum protection against oil leakage and wear, and to provide maximum protection against dirt and debris. Our products are designed to provide maximum protection against oil leakage and wear, and to provide maximum protection against dirt and debris.

SEAL-AIR CORPORATION
P.O. BOX 10000
CHICAGO, ILLINOIS 60680



Sealed Power

PISTON RINGS · PISTONS
CYLINDER SLEEVES

Publications

AVAILABLE

New Industrial Literature listed in this department is obtainable by subscribers through the Editorial Department of AUTOMOTIVE INDUSTRIES. In making requests please be sure to give the NUMBER of the item concerning the publication desired, your name and address, company connection and title.

D-81 Storage Batteries

Gould-National Batteries, Inc.—Announced is a 56-page revised edition of the handbook of technical instructions and engineering data on the care of motive-power storage batteries.

D-82 Metal Cleaner

Oakite Products, Inc.—Announced is the publication of a 48-page illustrated booklet describing specialized materials, procedures and equipment for use in cleaning metals, preparing metals for finishing, and for other cleaning and related processes involved in aircraft production.

D-83 Resistance Welding

International Nickel Co., Inc.—A technical booklet, T-33, on the resistance welding of nickel and high nickel alloys has been published.

D-84 Iron Hand

Sahlin Engineering Co.—Just issued is a booklet giving complete information concerning the features of the iron hand used on stamping presses.

D-85 Metal Products

Electro Chemical Engraving Co.—Issued is a six-page bulletin picturing the facilities of the company in the manufacturing, finishing and assembly of many types of metal products.

D-86 Quality Control

Sheffield Corp.—A booklet illustrating a few representative case histories of instrument gaging and statistical quality control is available.

D-87 Battery Charger

The Electric Products Co.—Bulletin, B. 11-220, contains information on the

E. P. four-circuit motor generator battery charger.

D-88 Rubber

Automotive Rubber Co., Inc.—Prepared is a catalog describing the firm's plant facilities, including their new rubber compounding mill and various products and services which they now have to offer.

D-89 Reamers

DoAll Co.—A 12-page brochure, 51-814, features a complete line of precision reamers is now offered.

D-90 Chains and Sprockets

Morse Chain Co.—Catalog, No. C 55-50, gives details on list prices, available sizes of types A, B, and C Morse stock sprockets, and pertinent information on stock roller chain from 3/4-in. pitch to two-in. pitch.

D-91 Strain Gages

Baldwin-Lima-Hamilton Corp.—Four ways in which Baldwin SR-4 weighing units are being used for industrial weighing are briefly described in a four-page bulletin.

D-92 Aluminum Castings

Aluminum Industries, Inc.—Bulletin, No. 20-A, presents the facilities which the firm has to offer to industrial companies that need aluminum castings.
(Turn to page 142, please)



THIS TIME SAVER COUPON is for your convenience in obtaining, WITHOUT OBLIGATION, more information on any one or more of the publications described above OR New Production and Plant Equipment OR New Products items described on other pages.

Readers' Service Department,
Automotive Industries,
Chestnut & 56th Sts., Philadelphia 39, Pa.

<p>Please send me:</p> <p>These FREE Publications</p> <p>(Use letter and designating number of each item desired)</p> <p>.....</p> <p>.....</p>	<p>Please send me more information on:</p> <p>New Production and Plant Equipment</p> <p>(Use letter and designating number of each item desired)</p> <p>.....</p> <p>.....</p>	<p>Please send me more information on:</p> <p>New Products</p> <p>(Use letter and designating number of each item desired)</p> <p>.....</p> <p>.....</p>
--	---	---

Your Name Your Title

Your Company Connection or Business

Address (Street & No.) (City) (Zone) (State)

SQUEEZE PLAYS... *that save you money!*

SAVE SPACE!

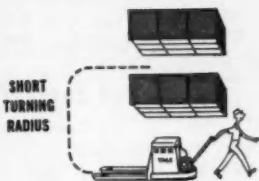
Thousands of square feet of it in aisles alone! Yale's Worksaver needs less room to work in so you gain valuable extra space for storage and production.*



*Consider this saving before building new facilities.

SAVE TIME!

You can quickly work heavy loads with this shorter, lighter, more maneuverable Worksaver, cut costs on jobs bigger trucks can't get at.



SAVE MANPOWER!

One man at the steering handle can free an entire gang from the "sweat, strain and sprain" of heavy hand lifting.



"WALK IT OR RIDE IT!"

Eliminate waste on hard-to-get-at jobs with these YALE WORKSAVERS

SAVE SAVE SAVE—that's the story of YALE'S Stubby Worksaver!

These pallet or platform trucks squeeze into small spaces to do big moving and lifting jobs...open up whole new areas of your plant to faster, more efficient materials handling...*cut your time and labor costs as much as 75%!*

The Yale Worksaver is a rugged trouble-free truck, too! A powerful electric drive unit, hydraulic lift and welded steel frame keep it on the job for years with a minimum of servicing.

Here's another YALE "expert" at cutting your costs

**YALE
EASY-LIFT
HAND TRUCK**



... Use it for short hauls, or in combination with Yale power trucks. YALE Easy-Lift makes it a cinch to lift and move heavy loads. It's light, maneuverable, sturdily constructed.

Send this coupon today!

THE YALE & TOWNE MANUFACTURING CO., Dept. 79
Roosevelt Boulevard & Haldeman Avenue, Philadelphia 15, Pa.

I am interested in cutting my materials handling costs.

Please send me free "Worksaver" literature.

Please send me free literature on Hand Trucks.

Name _____

Company _____

Street _____

City _____

State _____

YALE & TOWNE

The Yale & Towne Manufacturing Co., Philadelphia 15, Pa.

In Canada write The Yale & Towne Mfg. Co., St. Catharines, Ontario.

YALE is the registered trademark of The Yale & Towne Manufacturing Co.

AIRBRIEFS



By ROBERT McLARREN

DC-3 Immortal?

Some months ago we took occasion to eulogize the Douglas DC-3 transport plane as one of the immortals of aviation in still doing heavy-duty service nearly 20 years after its original conception. Now comes the news that the Douglas YC-47F, latest version of the famed transport, has just won the USAF Rescue-Evacuation and Search Aircraft Competition at Eglin Air Force Base, Fla. This model is a military adaptation of the slightly revised "Super DC-3," but is in its bones and sinews the same airplane that took form in a Pullman car on a cross-country trip by Arthur Raymond back in 1932. The new version is assisted in its quick takeoff task by a battery of 12 JATO units.

Securities vs Records

Since V-J Day the U. S. Armed Services have been in a quandary over the problem created by the performance of its latest aircraft in establishing new world's aircraft records. The problem has been simply that revelation of the exact performance attained would give aid and comfort to the enemy, notably the exact speeds and altitudes obtainable with our latest jet and rocket aircraft. Despite the fact that the Bell X-1, first piloted aircraft to attain supersonic speed, now is gathering dust in the Smithsonian Institution in Washington, the Air Force has not yet officially revealed its exact top speed attained in supersonic flights beginning August 14, 1947—more than four years ago. Recent flights by the Navy's Douglas D-558-II Skyrocket have far exceeded the speed performance of the Bell X-1, but still no application for an officially recognized world speed record. Seemingly inviolable has been the world's altitude record of more than 72,000 ft. held by a U. S. balloon since the mid-thirties. Now comes the somewhat guarded but nevertheless astonishing news that in a recent flight the Skyrocket exceeded this world's altitude record. The fact that a piloted aircraft has flown higher than 72,000 ft. is as much a shock to design engineers as it is to the layman, for few have dared predict such achievement by a winged aircraft. The Air Force viewed this announcement with obvious boredom as it busied itself with final preparation for an 80,000-ft. flight by its new Bell X-1D, a new model of the supersonic research plane equipped with turbine fuel pumps for its rocket propellants. Unfortunately,

the craft exploded in mid-air only seconds after Lt. Col. Frank K. Everest had scrambled back into the "mother" Boeing B-50 bomber. Assuredly, man is now probing well beyond the atmosphere in his search for better weapons.

Yet Even Higher

But these altitudes are but waymarks for U. S. research rockets at White Sands Proving Ground, N. Mex. The current record, of course, is about 135 miles held by the Martin Viking sounding rocket. However, a significant performance was obtained a few days ago when a Nazi V-2 rocket was sent to an altitude of 132 miles, the highest ever reached by this type and a considerable improvement over the long-standing 114-mile altitude record of the missile. Naturally, a speed record for this missile was also set on this outstanding flight, the 12½-ton missile racing at 3800 mph during its flight. Previously, about 3500 mph was the maximum attained by a V-2.

More Iron Curtain Leaks

Again technical news on Red Air Force developments has trickled through the Iron Curtain, this time some details on aircraft fuels. Russian jet aircraft are using "DHD" pressure hydrogen jet fuel, which is an alkali-naphthene with five per cent aromatic spirits added. Piston engine Red aircraft use "HLK" fuel, a 120-octane cyclopentane or hexane. Both fuels represent an obvious attempt at maximum engine performance to the complete abandonment of engine reliability and longevity.

Atom Aircraft

Confirming reports in this column many months ago, the Atomic Energy Commission and the Air Force have awarded a contract for construction of the first atomic-energy-powered aircraft to Consolidated Vultee Aircraft Corp. Although no details are available, it has long been suggested that the first atom-powered aircraft would have to be B-36-size in order to carry the weight of the huge engine plus its shielding. The standard B-36 can lift a load of 100,000 lb., and that should surely be enough for the job. No details on the kind of propulsive device to be used were announced, but it will undoubtedly

(Turn to page 130, please)

Introducing

A NEW



This Governor can easily be mounted at any location and driven by a standard S. A. E. Heavy Duty Flexible Shaft connected to the tachometer take-off.

It has a single pole double-throw switch enclosed in the cap for either Automatic re-set (Model GFA) or Manual re-set (Model GFM) with contact capacity of 10A at 125V non-inductive load. The rotating parts run in Sealed Ball Bearings lubricated for life and the entire unit is weather-proof.

These Governors can be mounted in any position and have the same characteristics as our Model GKA or GKM which we have been supplying for the past 20 years.

Speed can be adjusted to 20% over or under the ordered shut down speed while the engine is running. Ask for Bulletin 409-A or our catalog #4 describing our full line of Automatic engine control equipment.

SYNCHRO-START PRODUCTS, INC.

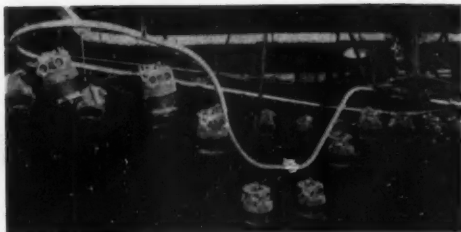
Automatic Engine Control Equipment

8151 N. RIDGEWAY AVE. • SKOKIE, ILL.

NEW PRODUCTION AND PLANT EQUIPMENT

For additional information please
use coupon on page 56

Southern light capacity
chain conveyor, the
Chain-Veyor.



(Continued from page 54)

intervals or, 60-lb loads can be carried at 12-in. intervals when supported by two pendants fitted with cross bar attachment.

The heavy duty drive uses a special sprocket type drive to distribute chain stresses and to afford a straight line

pull. It permits operation in either direction. Mounting is made at any 90 deg corner of the conveyor line.

Instant adjustment of conveyor speeds of from three to nine fpm while the Chain-Veyor is in operation is made possible by a vari-speed drive on all standard power units. Higher or lower speed ranges are available.

In the Chain-Veyor's design bronze universal joints have been placed at 3-in. intervals and, to assure equal wheel loading regardless of the direction of the chain pull, load wheels are mounted at a 45-deg angle to the load pendant and at a 90-deg angle to each other. Lifetime lubrication is provided by "Oilite" bearings. The Chain-Veyor permits smooth, frictionless negotiation of curves with radii as short as 15 in. it is declared. Any combination of turns are possible by joining horizontal, vertical top and vertical bottom curves together.

Highest Precision HARDENED & GROUND PARTS

THE ball stud shown here is a perfect example of the precision methods and quality material that go into the production of all Brown Hardened and Ground Parts. Twelve separate operations are employed to produce this vital part. Every feature about this ball stud has to be right—every feature is. It has strength, wear resistance, precision fit, true-ground spherical and tapered surfaces, close inspection and strict uniformity.

Brown Hardened and Ground Parts have been serving the automotive industry for over 40 years. We refer you to any of our long list of satisfied customers. For information pertaining to your own requirements, simply write or wire.

Henry W. Brown
PRESIDENT



Parts include:
King Pins
Shackle Bolts
Shackle Pins
Brake Anchor Bolts
Countershafts
Idler Shafts
Stub Axle Shafts
Steering Ball Bolts
Beam Bolts and Nuts
5th Wheel Rocker Shafts
Wheel Studs
Water Pump Shafts
... anything in the
hardened and ground
line, of any analysis
steel, up to 4 1/2" diameter.

THE BROWN CORP.

213 BELLEVUE AVE.

SYRACUSE, N.Y.

C. M. Ebert, 3407 Davidson Rd., Cleveland • N. F. Spring, 4716 Ballou Rd., Detroit • J. H. Henderson, 1606 N. Clark St., Chicago • Harry J. Windmiller, 1708 Carlton, Fort Worth • James W. Brown & Co., 1440 N. Boyle St., Los Angeles, Calif. • John B. Hart, 8611 S. E. Tenth Ave., Portland, Ore.

E-54—Table Conveyor

For assembly, inspection, and similar operations, a horizontal belt conveyor is being manufactured by The Rapid-Standard Co., Inc., Grand Rapids, Mich.

Called the Rapistan Table-Veyor, it is made in five ft sections which can



Rapid-Standard conveyor, the Table-Veyor.

be assembled in workable lengths from 10 to 60 ft. Belt widths range from 10 to 20 in. Side leaves can be fitted on either side of the belt to increase working space. Height of the unit is adjustable from 21 to 40 in.

Belt speed can be fixed or varied from five to 100 fpm, and the belt direction can be reversed. The motor used is a 1/3 hp, one phase or three phase.

(Turn to page 148, please)

for
**dependable
hardenability
in low alloy steels**

USE *Grainal* ALLOYS

For electric furnace steels as well as for open hearth steels, Grainal alloys are used successfully to increase hardenability.

An appreciably larger quantity of Grainal is usually required in electric furnace practice because of the higher nitrogen content characteristic of steels produced by this method. The conversion of the nitrogen content of the steel to an ineffective compound, as is done by some of the components of Grainal, permits a minimum amount of boron to produce the desired effects.

Grainal alloys are metallurgically balanced so that the larger additions required by electric furnace steels can be made safely without exceeding the boron limit for hot shortness.

VANADIUM CORPORATION OF AMERICA

320 LEXINGTON AVENUE, NEW YORK 17, N.Y. • DETROIT • CHICAGO • CLEVELAND • PITTSBURGH

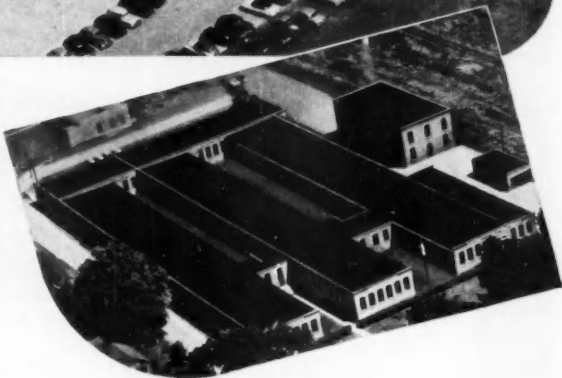
MAKERS OF ALLOYS





200,000 SQUARE FEET
OF MODERN PRODUCTION
EQUIPMENT AND SKILLS

CAMCAR



TWO SPECIALLY DESIGNED PLANTS PRODUCING
SPECIALS • SEMS • THREAD-CUTTERS • AIRCRAFT • PHILLIPS HEAD SCREWS

IN ALL COLD-HEADING MATERIALS



SUPPLY... is Camcar's Standard. From raw material storage to shipping dock, Camcar specialists know that Screws, Fasteners, and Special Parts serve no good purpose until they are assembled into your products. Hundreds of CAMCAR specialists are making it their business to produce millions of Screw Fastenings and Special Parts... to match the efficiency of your high production assembly lines.

Don't take our word for it... prove to yourself how speedily and efficiently CAMCAR Special and Standard Screw Fasteners can be shipped to your assembly lines.

TELEPHONE 5-9451

TELETYPE RK-53

CAMCAR SCREW & MFG. CORP.
606 EIGHTEENTH AVENUE ROCKFORD, ILLINOIS

YOU'LL HEAR THIS NAME OFTEN

CAMCAR

specials

... "Production-Designed for Your Assembly Line"

NEW PRODUCTS

FOR ADDITIONAL INFORMATION regarding any of these items, please use coupon on PAGE 56

F-65—Selenium Rectifier Welder

An arc drive control to produce electrical transient characteristics desirable for certain welding operations now is available on type RA selenium rectifier welders, manufactured by Westinghouse Electric Corp., Pittsburgh, Pa.

Arc drive permits adjustment of the arc characteristic to suit a particular job. The device operates automatically



Westinghouse arc welder, type RA.

and instantaneously to provide an extra surge of welding current at the moment the arc becomes shorted, either by contact between the electrode and the work or by a globule of molten metal bridging the arc gap.

A self-heating thermostat is provided in the arc drive circuit to protect it from overheating due to sustained short-circuit of the welding terminals.

F-66—Color Coated Metal Coils

Metal coils, pre-coated in color and precision slit to exact width, called Enamelstrip, are being produced by the Enamelstrip Corp., Allentown, Pa.

Coil is available in cold rolled steel, electro-galvanized steel and electrolytic tin plate, brass, zinc and aluminum in

any desired color or shade, coating on one or two sides. The process which binds the adhesive coating to the metal is said to enable the coil to withstand the stresses of drawing, bending, forming and fabricating without cracking or peeling.

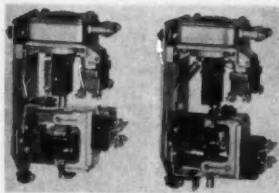
F-67—Paint Masks

Masks for decorating and identifying products requiring simple or elaborate color schemes have been brought out by Jas. H. Matthews & Co., Pittsburgh, Pa. The Matthews spray mask is a shell-like mold which fits snugly over an object to be colored. Surface of the object to remain protected is covered by the mask, while cavities in the mask permit color to be applied on the desired parts.

Made of non-corrosive materials, each mask is electrocasted to conform to every contour of a product, regardless of its size or shape.

F-68—Invertible Magnet Timing Relay

For timing machine tool cycles, conveyor systems, and similar industrial operations, the Square D Co., Milwaukee, Wis., Class 9050 Type R pneumatic timing relay utilizes an invertible mag-



Square D timing relay, Class 9050, Type R.

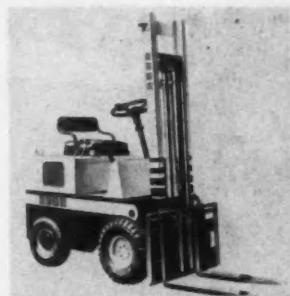
net. Depending upon the position of the actuating magnet, contacts operate with delay either after energization or after de-energization of the magnet. The invertible ac magnet permits conversion from delay after energizing operation to delay after de-energizing, or vice versa.

Timing range is adjustable from 0.2

sec to three min. Accuracy is within 10 per cent, and is independent of normal variations in voltage, ambient temperature, and atmospheric pressure. Operation of the timer is based on the principle of air transfer between two chambers through a restricted orifice.

Silver-to-silver, snap action contacts have pilot duty ratings up to 600 volts, ac. One or two additional electrical interlock units can be furnished. The timer is available in NEMA I, IV and VII enclosures. Type R, ac timers can be furnished with operating coils for voltages up to 600 volts, 25 to 60 cycles.

F-69—Fork Lift Truck



Buda pneumatic tire fork lift truck.

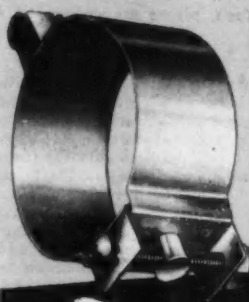
Supplementing their line of fork lift trucks in capacities from 2000 lb to 6000 lb, are the pneumatic tire models FPB20-24 and FPB20-15 fork trucks now being manufactured by the Buda Co., Harvey, Illinois.

Features of these fork trucks include: carriage mounted on adjustable side thrust rollers; extra strength and self-aligning mast; single lever two speed forward and two speed reverse gear shift, complete complement of gauges and switches on full front vision instrument panel; and quick change heavy duty clutch.

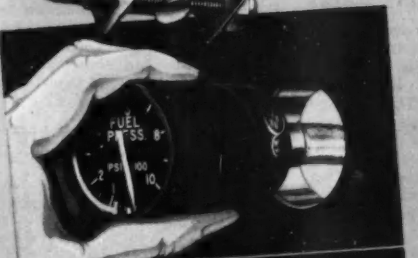
Powered with a four cyl, 61 cu in. displacement engine, the trucks are available in five standard masts with a lift of 72 in., 84 in., 108 in., 114 in. and 120 in.

(Turn to page 64, please)

ENGINEERS' NOTEBOOK



New Clamp Allows Attachment of Instruments from Dial Side of Panel



Significant savings in assembly and servicing time are achieved by Marman Products' new instrument mounting clamp. The clamp is installed on the rear of the panel but mounting or removing is easily accomplished from the dial side of the panel by adjusting only one clamp actuator screw.

Marman part No. 23906 clamp conforms to specification MIL-C-6818 and is installed in accordance with Specification MIL-C-6822.

Save Cost, Time and Weight with Marman Standard Clamps for Special Applications

FOR INFORMATION, WRITE DEPT. A-9

MARMAN
PRODUCTS CO. INC.

940 WEST FLORENCE AVENUE
INGLEWOOD, CALIFORNIA

NEW PRODUCTS

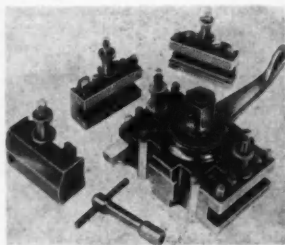
For additional information please use coupon on page 56

(Continued from page 63)

F-70—Universal Tool Holder

The Dimco, universal tool holder for clamping on the lathe, is now available from Kelvin Systems Corp., South Norwalk, Conn. Made in two sizes, the unit has been designed to fit any engine lathe for production runs.

Consisting of a main center section which is fixed in position on the compound, it may be rotated through 360



Kelvin universal tool holder, the Dimco.

deg. There are slides on two sides of the main section, and a set of slides in front.

Standard practice is to furnish a 5-tool setup for each tool post. These consist of a tool setup with a Morse taper hole for drill chuck or boring bar, a v-type setup for holding a round bar, and three setups for square or rectangular shape tools.

Dimco universal tool holder is provided with a cam action for interchanging tool setups.

F-71—Nylon Liner for Bearings

Du Pont FM 10001, a nylon, is being used as a bearing material by Thomson Industries, Inc., Manhasset, N. Y., for their recently developed Nylined bearing. A typical Nylined bearing consists of an outer sleeve of metal and a relatively thin lining of nylon bearing material. The nylon liner is retained in the outer sleeve in a manner which will permit it to expand and contract circumferentially around the inner periphery of the outer sleeve.

The liner is provided with a narrow slot, or compensation gap, which interrupts the circumference. In appli-

(Turn to page 108, please)



Stainless Steels
of all analyses

SuVeneer Clad Metals
copper and nickel clad steel

Alloy and Spring Steels
and specialties

the ***Specialists'***
name
in fine strip steels

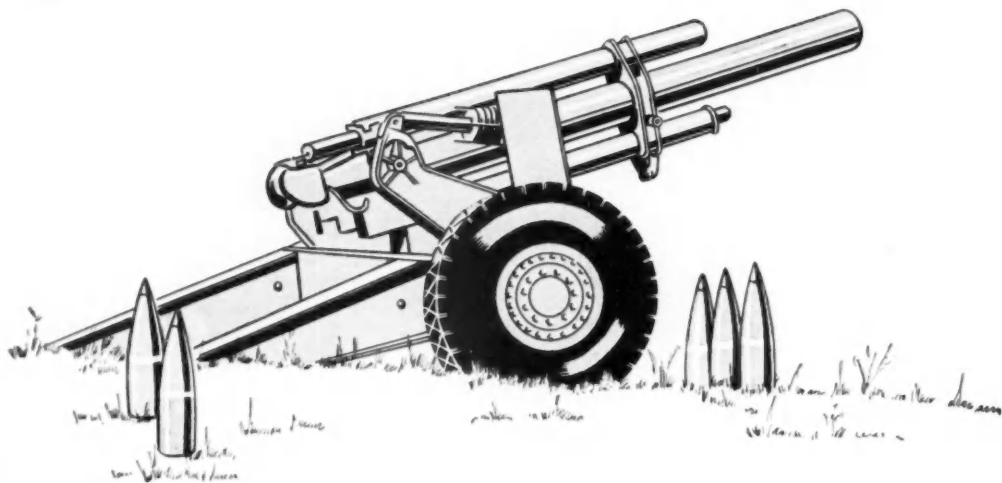
Every Superior customer benefits by the fact that our entire manufacturing concern is with quality strip steels. No other product claims a share of our attention . . . all of our experience, research, equipment and methods are concentrated solely on precision strip steel production.

That's why Superior strip behaves properly in your fabricating process—and why you can count upon Superior for consistent quality in performance, coil after coil.

Superior Steel

CORPORATION

CARNEGIE, PENNSYLVANIA



Blasting an old-fashioned coolant idea!

More and more machinists are cutting coolant costs and improving production by using Houghton *Antisept* "across the board". They're finding this all-purpose base covers better than 90% of their metal-cutting jobs. They're convinced it's getting old-fashioned to use a different coolant for every operation in the shop.

You'll use *Antisept* for general machine work . . . for automatics . . . for stamping and forming. You'll handle one instead of many cutting oils. You'll save space, write smaller inventories, simplify selection. Two good examples of precision machining with *Antisept* All-Purpose Base are given here.

Ask the Houghton Man to show you how *Antisept* can be used as coolant and die lubricant over many operations. Or write E. F. Houghton & Co., Philadelphia 33, Pa., for full information and prices.

TWO GOOD EXAMPLES OF ANTISEPT'S DEFENSE APPLICATIONS

One well-known plant machining shells is using *Antisept* to 25 parts water in:

1. Rough turning
2. Semi-finish turning
3. Machining nose
4. Shell body turning and finishing
5. Cutting off center boss
6. Cutting and finishing recess band groove

In machining of 15-ft. 90 mm guns, another plant performs the following operations using *Antisept* mixed with water in proportions shown:

1. Boreing (1 to 20)
2. Machining powder chamber (1 to 15)
3. Machining breech end (1 to 30)
4. Machining muzzle end (1 to 30)

ANTISEPT

ALL-PURPOSE BASE
HIGH IN ANTIWELDING PROPERTIES AND
FATTY CONTENT

LATEST BULLETIN

on Houghton *Antisept*—showing its versatile applications—will be mailed on request.

E. F. HOUGHTON & CO.
PHILADELPHIA • CHICAGO • DETROIT • SAN FRANCISCO



**Ready to give you
on-the-job service . . .**

Small Gas Turbine

(Continued from page 35)

with compressor and turbine blades situated on opposite sides of a common disc. However, consideration of all factors resulted in a decision to use separate rotors.

As illustrated in the section diagram (Fig. 1), the two rotors are separated by approximately 0.5 in., measured at the hub. They are mounted on the shaft adjacent to the roller bearing in a cantilever arrangement. At rated speed of 40,300 rpm, the peripheral speeds of the 6.97-inch compressor rotor and 7.42-inch turbine rotor are 1220 and 1300 fps respectively.

The modified elbow-type combustion chamber was selected chiefly to conserve space.

For maximum simplicity, the reduction of turbine speed to the pump speed requirement was accomplished by a single spiral bevel gear and pinion, providing right-angle drive.

The arrangement of components is illustrated in Fig. 2. The envelope dimensions of the set are: length, 26½ in.; height, 23½ in.; width, 23½ in. The dry weight, less fuel and tanks, is 165 lb; fuel for one hour's sustained operation, with tanks, weighs 112 lb additional.

Performance

The table just above reflects operating performance of the power plant during an actual test in the shop.

Other test runs were conducted to determine maximum power absorbed by the water pump with the discharge lines wide open and with minimum suction at the pump inlet. Test results were 770 gpm at 82 psi, which is equivalent to 57 shp. Turbine inlet temperature increased to 1275 F with a 6 per cent decrease in fuel consumption, giving an sfc of 2.1 lb/hp-hr. Turbine speed was held approximately constant during all test runs.

Compressor

The centrifugal type compressor rotor is machined from a 25ST aluminum alloy forging. Blade leading edges are shaped to serve as an inducer. Both the turbine and compressor rotors are mounted back-to-back, with a seal plate between, on a common shaft which extends through the center of the compressor scroll and air inlet casing. A nine-blade, stainless steel compressor diffuser is bolted to the scroll. Compressor air is discharged through a bellows-type expansion joint to the combustor inlet. A butterfly valve in the scroll outlet provides a means of creating a low velocity area in the combustor during starting to facilitate ignition.

(Turn to page 68, please)

Power Plant Operating Performance

Compressor inlet air temperature	81 F
Air flow	2.35 lb/sec
Compressor pressure ratio	2.44
Compressor efficiency	74.5%
Combustion efficiency	75.0%
Turbine efficiency	78.0%
Turbine speed	39,800 rpm
Compressor discharge temperature	316 F
Turbine inlet temperature (average)	1142 F
Tailpipe temperature (without cooling)	900 F
Fuel flow	104 lb/hr
Specific fuel consumption	2.22 lb/hp-hr
Pump discharge pressure	103 psi
Water flow	505 gpm
Suction lift	18.7 ft
Turbine shaft output	46.8 hp

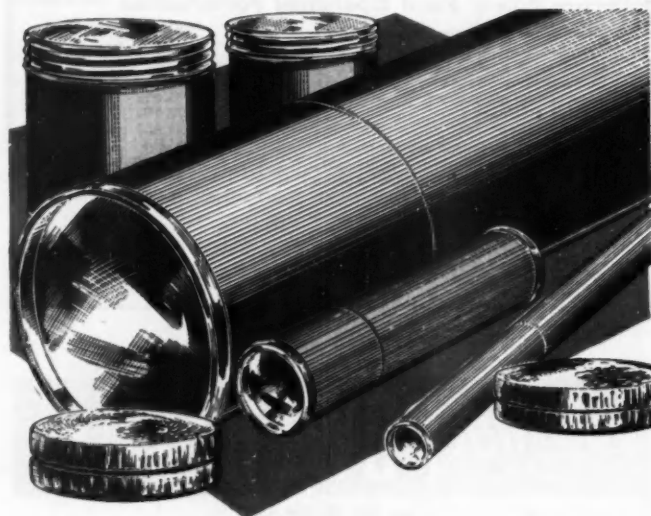
CONTROL POWER BETTER

CLUTCH PROBLEM?

Call in a ROCKFORD clutch engineer. Make use of his quarter century of clutch designing and building experience. Thousands of manufacturers, in almost every industry, have licked their power transmission control problems—with the right type, size and capacity clutch application—
—from the complete ROCKFORD line. Let ROCKFORD engineers help solve YOUR clutch problem.

ROCKFORD CLUTCH DIVISION
BORG-WARNER
315 Catherine Street, Rockford, Illinois

ROCKFORD CLUTCHES



CLEVELAND CONTAINERS

*Reduce Loss or Damage
to Parts in Transit*



... Faster assembling with less effort ... more units per container.

... Save steps and time in production and forwarding.

CLEVELAND CONTAINERS have unusual STRENGTH and RIGIDITY.

REDUCE COSTS in thousands of plants.



We DESIGN and DELIVER quickly the TYPES of CONTAINERS that will meet YOUR individual needs and enable you to maintain schedules.



Ask, also, about our PLUGS, SLEEVES and CAPS to protect threads and parts against damage.



Samples gladly furnished

The **CLEVELAND CONTAINER Co.**

6201 HARBERTON AVE. CLEVELAND 2, OHIO

• All-Fibre Cans • Combination Metal and Paper Cans
• Spirally Wound Tubes and Cores for all Purposes

PLANTS AND SALES OFFICES: Cleveland, Detroit, Chicago, Plymouth, Wis.,
Jamestown, N. Y., Ogdensburg, N. Y. • ABRASIVE DIVISION at Cleveland
SALES OFFICES: Grand Central Terminal Bldg., New York City; Washington
Gas Light Bldg., Washington, D. C.; West Hartford, Conn.; Rochester, N. Y.
Cleveland Container Canada, Ltd., Prescott, Ontario • Office in Toronto and Montreal



Small Gas Turbine

(Continued from page 67)

Combustor

Between the compressor scroll outlet and the turbine scroll inlet is a modified elbow-type combustion chamber, formed from Type 321 stainless steel in order to conserve critical materials. It differs from the normal gas turbine combustor in that there is no liner, but only a short, flared, dome-shaped flameholder set in the turbine scroll opening. An 8.3 gph, 80-deg spray angle Monarch nozzle admits fuel to the airstream through the flared skirt of the dome. An aircraft spark plug, set just below the skirt, initiates combustion, which is held inside the dome or flameholder.

Turbine

As previously mentioned, the radial inflow turbine rotor is mounted on the shaft with the compressor rotor. Its blades are shaped to form an exducer in the same manner that the compressor blades are shaped to form an inducer. The rotor is encircled by the turbine scroll and nozzle, and a short tailpipe is centered behind the rotor hub. No exhaust diffuser is used, but a means is provided for cooling the exhaust gases. Hot gases pass from the combustor into the turbine scroll and are directed angularly inward by the turbine nozzle blade contour. Thence they whirl farther inward through the rotor and turn to exhaust axially through the tailpipe.

A Hastelloy B forging was chosen for the turbine rotor. This part was machined, on the prototype model, but future rotors will be investment cast in order to hold down manufacturing costs.

Bearings

Ball bearings are used exclusively in the power plant, and since the pump impeller is mounted on the speed reducer output shaft, there are no bearings in the pump. Two main bearings support the turbine shaft in the air inlet housing. A matched pair of angular-contact ball bearings are located on the power output end of the shaft to take approximately 92 lb of pinion gear thrust, and a single roller bearing is installed on the rotor end. Radial grooves cut in the mating surface of the outer races provide for pressure lubrication of the ball bearings. Oil from the pump passes through these grooves onto the inner races. At the high operating speed of the main bearings, air-oil mist is formed in sufficient volume to lubricate the roller bearing also.

The main or output shaft of the speed reducer is supported in a double-row thrust ball bearing and a single-row ball bearing. Accessory drive gear (Turn to page 70, please)

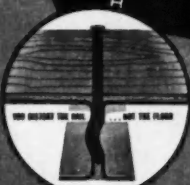
No Deadweight Here!

N-A-X
HIGH-TENSILE STEEL

For Trailer Bodies



The new Durasteel Van manufactured by Flasher Trailer Co.



*Great Lakes' Stran-Steel Flooring has high strength and light weight. Its patented nailability permits safe blocking of loads. You distort the nail . . . not the floor.

America's first all-steel trailer body is on the highways—roof, sides, framing and flooring,* all of N-A-X HIGH-TENSILE steel. Years of planning, testing and research went into this unique trailer body, making it the most serviceable ever built.

1. The use of N-A-X HIGH-TENSILE steel in this equipment results in light weight with strength and durability.
2. In addition to greater strength, N-A-X HIGH-TENSILE steel has greater resistance to fatigue, impact, corrosion and abrasion. It offers a greater strength-to-weight ratio with longer life and larger payloads.

More and more of America's highway equipment manufacturers are swinging to N-A-X HIGH-TENSILE steel. Millions of on-the-job miles have proved the superior qualities of this steel . . . have proved its over-all economy.

GREAT LAKES STEEL CORPORATION

N-A-X Division • Ecorse, Detroit 29, Michigan



NATIONAL STEEL CORPORATION

shafts and the gear-type oil pump shafts are each borne in single-row ball bearings. Lubricating oil is directed through a jet nozzle against the out-of-mesh point between the input bevel gear and pinion. The high speed of the pinion here also causes air-oil mist to form and to maintain ample lubrication of the other bearings in the gear housing.

Reduction Gear and Accessory Drive

Speed reduction between the 40,300 rpm power unit and the 4428 rpm water pump is accomplished by a 9.1 to 1 spiral bevel gear and pinion combination. The pinion is secured to the tur-

bine shaft where it extends into the gear housing, and meshes with the driven gear mounted on the speed reducer output shaft. The turbine axis is thus at a right angle to the output shaft. The pump impeller is mounted on one end of the latter, in the pump housing. The starter sprocket and clutch are mounted on the other end of it. Spur gears and a pinion on the output shaft drive the fuel pump and governor, oil pump, and overspeed shut-off valve. Gears, shafts, and bearings are enclosed in the gear housing, which also forms the lubricating oil reservoir and sump. The housing is supported between the drive end of the

turbine and the water pump housing, with the oil pump and filter attached to it.

Fuel System

Fuel for one hour's sustained operation at full load is contained in two seven-gal tanks. During operation the tanks are mounted on the tubular frame of the unit above the turbine tailpipe. Each tank is connected to a fuel manifold on the control panel by a short hose and self-sealing coupling. Fuel system arrangement is illustrated in Fig. 2. When the turbine is in operation, fuel flows from the manifold through the fuel filter, overspeed shut-off valve, fuel pump and governor to the throttle valve and then to the fuel nozzle. At starting, only the right-hand tank can be used, as the left-hand tank covers the butterfly valve which is essential to starting procedure. After the start, however, either or both tanks can be connected. The self-sealing couplings allow either or both tanks to be replenished during operation without interruption of fuel flow.

Lubrication System

A gear-type oil pump with integral pressure relief valve draws lubricating oil from the reservoir, pressurizes it to a constant 20 psi, and delivers it at 0.75 gpm to the turbine and reduction gear bearings. Scavenge oil passes by gravity back to the reservoir.

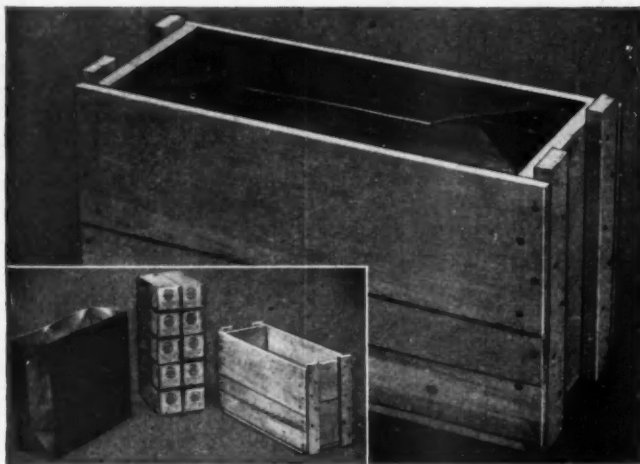
Ignition System

Ignition is required only momentarily during the starting cycle. A magneto and spark plug are used to ignite the fuel-air mixture when the turbine has accelerated to approximately 4500 rpm. The magneto is equipped with a sprocket drive, connected by chain to a sprocket on the handcrank shaft. At 4500 rpm turbine speed, the magneto is rotating at a speed capable of delivering sufficient ignition current to the spark plug. After ignition, cranking is continued until a speed of 11,000 to 12,000 rpm is reached, at which time the engine becomes self-sustaining and accelerates further under its own power. The handcrank chain drives through an overrunning clutch at the reduction gear box, which precludes the turbine from driving the handcrank chain and shaft.

Accessories and Controls

A simplified control system governs sustained operation once the T-45 starting cycle has been completed. Exclusive of the fuel and oil supply systems previously covered, only three accessories and five instruments are used. The control system maintains rated turbine and pump output under varying ambient temperature conditions and during load changes resulting from the opening and closing of additional hose nozzles. It also protects the equipment from overspeeding due to loss of prime.

(Turn to page 74, please)



How To Assure Delivery Of Military Materials and Equipment In Factory-Fresh Condition—

Government specified packaging need not be a troublesome item in a defense contract for military materials or equipment. That's our business. As fabricators of paper, flexible plastics and laminated foils, we are fully experienced and prepared to produce the water-proof case liners (as illustrated) and moisture-proof desiccated packaging that can assure delivery of your products in factory-fresh condition; maintain such condition in storage, too. Yes, Kennedy is your dependable source of dimensional packaging...engineered to the specified requirements of practically any products from huge aircraft engines to food and medical supplies. Investigate today.

TAILOR-MADE TO MILITARY SPECIFICATIONS

Desiccated Packaging:

MIL-E-6040
supersedes AN-E-1-b)
MIL-C-6056
supersedes AN-C-67-b)
MIL-B-131-a
supersedes JAN-P-131)

JAN-P-116
JAN-P-117
AN-P-13-a

Case Liners:

JAN-P-125
MIL-L-10547-a

DIMENSIONAL PACKAGING



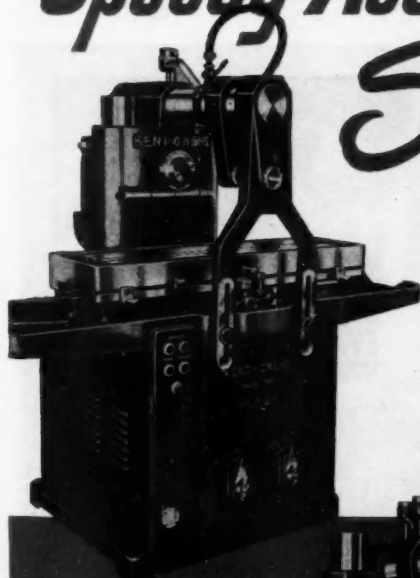
Kennedy

CAR LINER AND BAG COMPANY INC.

SHELBYVILLE, INDIANA

NEW YORK PHILADELPHIA BUFFALO CLEVELAND DETROIT CHICAGO
LOS ANGELES SAN FRANCISCO PORTLAND SEATTLE

Speedy Accurate Milling Saves Labor!



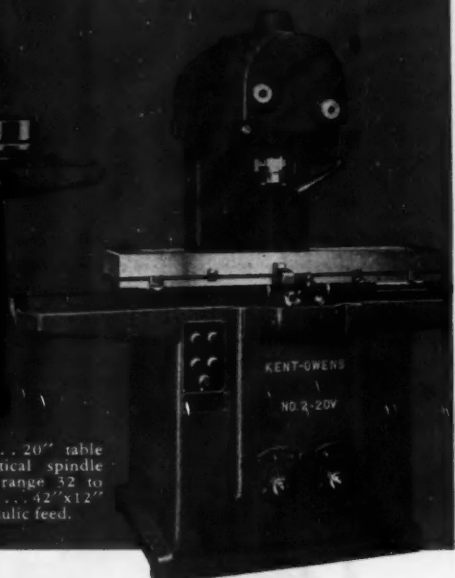
No. 2-20 ... 20" table travel ... 42" x 12" table ... full automatic hydraulic feed.

On countless jobs—Kent-Owens Milling Machines have shown ability to turn out work with top speed and high accuracy. They're designed for rapid, easy set-up and operation. Rugged ... with twin-post head mounting that assures balanced load—no chattering. Practical features throughout to help you *produce more* ... with *lower costs*! Write for bulletins on the Kent-Owens Standard line ... including wide range of hydraulic and hand operated machines. Also, let our engineers help you with tooling and special machine requirements.

Kent-Owens Machine Co., Toledo, Ohio.



No. 2-20 DS ... Double Spindle for two milling operations ... 20" table travel ... 42" x 12" table. Hydraulic feed.

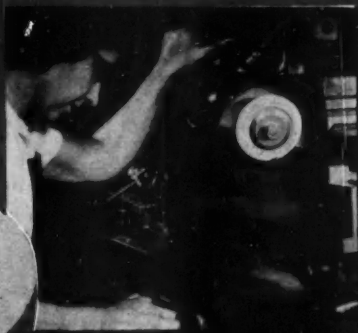


No. 2-20V ... 20" table travel ... vertical spindle with speed range 32 to 1284 R.P.M. ... 42" x 12" table. Hydraulic feed.

Call on
KENT-OWENS
For Milling Machines

Cutting Tool Room Costs

VTD BOND WHEELS. With these wheels, you are assured of accurate low-cost grinding of tool steels—even H-formations. White in color, they have unusual form and size holding qualities. And so versatile, wheel inventory is greatly simplified.



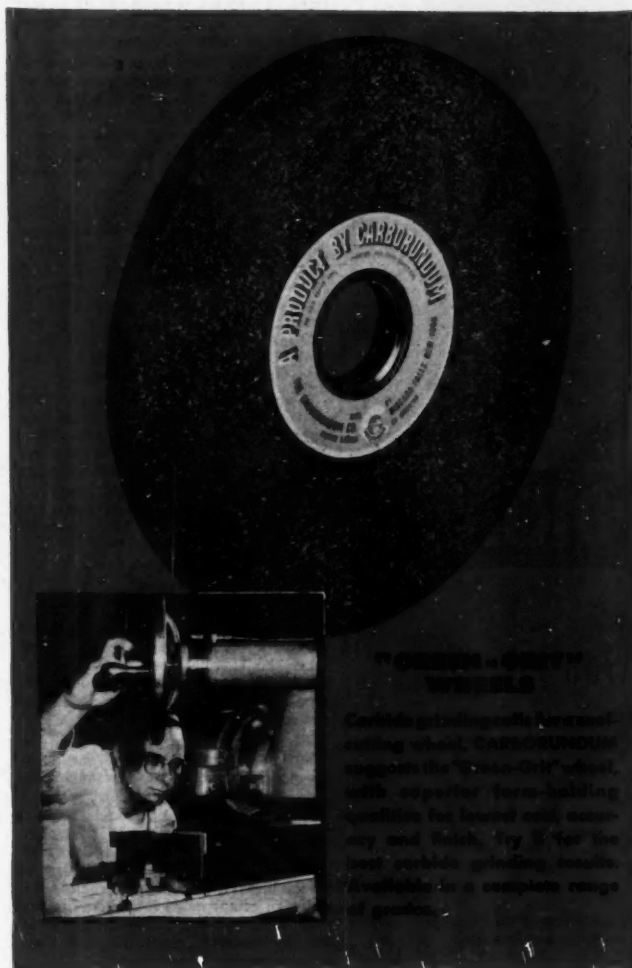
VTD BOND WHEELS. Need fast and accurate repetitive grinds? Here's the RIGHT wheel. Blue-gray in color, they're noted for a high rate of stock removal at reduced wheel pressures, minimum heat generation. Producing higher finishes, they extend tool life between grinds, thereby extending overall tool life.



Only **CARBO** TRADE

"Carborundum", "Aloxite" and "Green-Grit" are trademarks which indicate manufacture by The Carborundum Company, Niagara Falls, New York

easy with RIGHT Abrasive

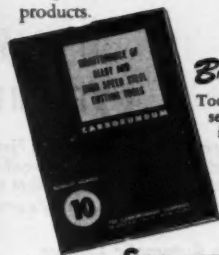


For grinding wheels, CARBORUNDUM suggests the "True-Grit" wheel, with superior form-holding qualities for longer and more easy and fast. Try it for the best grinding results. Available in a complete range of grades.

No matter what your abrasive job in the tool room, there's a product by CARBORUNDUM to do it best. You select the *right* product for every job in the tool room from CARBORUNDUM's *complete line* of abrasives.

Your CARBORUNDUM representative or distributor is equipped to recommend not just a product, but a method. From his knowledge of *all* abrasives, he can help you select the very best abrasive method, and *then* recommend the abrasive product to be used. In this way, you *know* you're getting the best results at lowest cost.

● Don't forget the rest of the complete CARBORUNDUM line—Diamond Wheels, for instance, or tool room sticks, and complete selection of all coated abrasive products.



Brand New
Tool grinding booklet sent FREE. Detailed information, charts, illustrations.

See your
**CARBORUNDUM
REPRESENTATIVE...**

or write Dept. AI 81-22, CARBORUNDUM distributors are located in all principal cities.

RUNDUM

MARK

makes ALL Abrasive Products...to give you the proper ONE



IMPORTANT

precision production

For more than 35 years The Pierce Governor Company, Inc. of Anderson, Indiana, has excelled in the design, engineering, and production of important parts for the Automotive and Aircraft industries. Today's production features:

Sisson Automatic Chokes

Complete line of precision engineered chokes for the automotive industry—original equipment and replacement parts

Famous Pierce Governors

Pierce centrifugal-mechanical and hydra-mechanical governors for gas, gasoline and Diesel engines—automotive and industrial.

Aircraft Engine Controls

Design and manufacture of precision hydraulic and mechanical fuel control systems for leading aircraft engines

Hydraulic Transmission Controls

Manufacture of control mechanisms for hydraulic transmissions

Let Pierce's precision engineered products and manufacturing facilities solve your problem! Write . . .

The Pierce Governor Co., Inc.
Anderson, Indiana

PIERCE
GOVERNORS

cavitation, or malfunction. This is automatically accomplished without attention from the operator. In addition, the system indicates fuel, lube oil, and water pump discharge pressures at all times. The location and inter-connection of control components is brought out in Fig. 2, and the function of control components is given below.

The fuel pump is a gear-type unit driven off the reduction gear. Its normal rating is 3250 rpm, at which it delivers 55 gph of fuel to the governor inlet (approximately three times the maximum requirement of the power plant). A booster pump is not needed at starting or otherwise.

The governor, mounted on and driven by the fuel pump, is a droop or proportional control type. After the start it regulates fuel flow to maintain turbine speed at 40,300 rpm, and bypasses excess fuel back to the pump inlet. A minimum flow valve always assures enough fuel to prevent loss of combustion, even with the governor bypass wide open at extreme overspeed.

The overspeed fuel shut-off valve, driven off the reduction gear, is a spring-loaded, flyweight-actuated shut-off in the fuel line between the tank and the pump. It is opened manually prior to the start and held open by a latch. If the turbine overspeeds, the flyweight releases the latch and the spring moves the valve closed.

Starting

So far as is known, the T-45 is the first gas turbine ever built which is started by hand. Design features minimize the exertion necessary to bring the turbine up to speed by hand cranking, and the main contributing factors are as follows:

First, a moderate pressure ratio was selected, because normally the lower the pressure ratio of a gas turbine engine, the lower the speed at which it becomes self-sustaining and the less effort is required to crank it. Another factor in choosing a pressure ratio lower than those possible with this type wheel and reasonable efficiencies, was a design compromise forced by limiting turbine tip speed to an acceptable value for the material strength at the turbine operating temperature.

Second, mechanical losses were avoided by eliminating bearings where possible, and using anti-friction type where bearings were essential.

It was assumed during initial design that hand starting would be significantly aided by the use of a manual butterfly valve in the compressor discharge. This valve would be closed, taking pumping load off the compressor, during acceleration up to ignition speed, and then opened for the balance of the cycle. In practice, however, this effect was found to be of little help, although the valve was retained to insure positive ignition at all times.

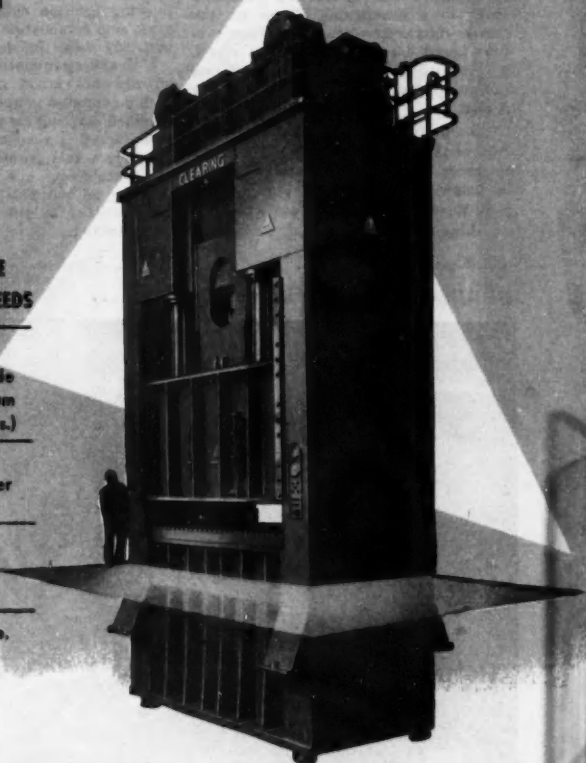
The chain and sprocket arrangement between handcranks and pump shaft.

SPECIALIST in VARIETY

SELECTOR SWITCHES PROVIDE CHOICE OF THESE
MAXIMUM CAPACITIES AND CORRESPONDING SPEEDS

SINGLE ACTION		DOUBLE ACTION	
MAXIMUM CAPACITY (Tons)	SPEED (Inches per minute)	(Figures refer to inner slide only. Blankholder maximum capacity 500 tons in all cases.)	
		MAXIMUM CAPACITY (Tons)	SPEED (Inches per minute)
333	264		
667	132		
833	104		
1000	88	333	264
1167	75	667	132
1500	58	1000	88

Quick approach and return—400 inches per minute.



Most Clearing presses are built to do some special job with maximum production efficiency and thus at minimum cost per piece. But when the customer's requirement is for a press of wide utility, to take a great variety of work, Clearing still comes up with the right answer.

This hydraulic press can handle a draw of 30" with ample space for lift out. Yet when the work is shallow, it has a minimum shut-height of only 20". All of its 1500 tons capacity can be applied as a single action press, but movement of a few selector switches and

removal of brackets makes it a double action machine with a 500 ton blankholder and 1000 ton punch. No slide bolster is necessary. Capacity can be reduced to as little as 333 tons with corresponding increase in pressing speed, and changed back again, with electric switches.

Quick, easy adjustment from one kind of work to another makes this specialist in variety a practical, economical answer to short run or jobbing problems. Ask us to show you how this press, or a different sized variation of it, can fit your requirements.

CLEARING MACHINE CORPORATION

6499 WEST 65TH STREET ★ CHICAGO 38, ILLINOIS



CLEARING PRESSES

THE WAY TO EFFICIENT MASS PRODUCTION

with the gear-and-pinion pump-to-turbine connection, provides an 81 to 1 speed increase in the starting train, and leads to a practicable torque on the cranks during accelerations. When turbine speed exceeds crank input speed, a Formsprag overrunning clutch on the pump shaft disengages the starting device.

To clarify this unconventional starting method, a simplified step-by-step sequence of starting operations is added below.

1. With the butterfly valve closed, cranking is started and continued until

pump speed reaches 500 rpm. Then the throttle is opened.

2. At this speed the magneto is delivering ignition current to the spark plug, and combustion commences. The butterfly valve is opened immediately.

3. Cranking is continued, with throttle adjustments made manually to keep turbine exhaust temperature within the specified starting range, until 1200 rpm pump speed is reached.

4. From this point on the engine is self-sustaining, and with continued throttle adjustments per (3) it will accelerate up to governed speed without cranking.

BRAINARD TUBING IN THE MAKING...



THE WELDING OPERATION involves a split electrode with current passing from one side to the other, heating the tube to welding temperature. The side pressure rolls then force the bond. Excess metal is peeled off, making a clean, neat tube. Busy as we are in times like these, this operation gets careful supervision at Brainard. We have complete control of every operation from ore to tube. That's why it will pay you to call on Brainard first when you have a job for electric welded mechanical tubing. Straight or fabricated. Sizes: ½" to 4"—.025 to 165.

Sales offices: Atlanta, New York, Cincinnati, Pittsburgh, Buffalo, Chicago, Philadelphia, Dearborn, Cleveland, Tennessee, N.Y., Rochester, Indianapolis, Nashua, N.H. Sales representatives: Sheraton Products Co., Dearborn, Mich., Grand Rapids, Mich. and Farrell, Pa. Fred J. Reynolds, Davenport, Iowa. Brass & Copper Sales Co., St. Louis, Mo. and Kansas City, Kan. Julius Scholz, Dallas, Texas.



WARREN, OHIO

Dynamometer

(Continued from page 36)

actuate the torque-measuring equipment with very little friction. Angular movement does not affect the shaft alignment. In addition, the mounting is stable in the axial and lateral directions.

Four radially located spherical pads, two at each end of the cradle, support the common base or cradle which carries the motor and speed-increasing gear. Oil is pumped between the mating spherical surfaces to float the unit on a film of oil. Torque is measured by a thrust meter which engages an arm extending horizontally from the cradle in line with the shaft center. The two spherical pads at each end of the cradle conform to a common spherical surface having a radius of curvature originating at the center line of the shaft.

Upper convex spherical pads are bolted to surfaces on the lower part of the cradle. These pads are insulated from the cradle so that oil film separation can be checked by indicating lights in a low-voltage circuit.

A set of low speed gears and two separate sets of high speed gears having different ratios provide the means for doubling the range of speed of the dynamometer. A hydraulically actuated shifting device enables the pinions of either one of the two sets of high speed gears to be coupled to the output shaft. With an input speed of 1120 rpm, one set of high speed gears has an output speed of 7528 rpm while the other set has an output speed of 15,072 rpm. The gear is rated 21,500 hp at an output speed of 7528 rpm and 18,000 hp at the top output speed of 15,072 rpm. The gear is of the divided train type with the horsepower input divided equally between two identical intermediate assemblies which are coupled to the high speed gears by quill shafts and involute tooth couplings.

Truck System

(Continued from page 44)

are largely handled by conveyors—moves through the foundries in skid-boxes.

Castings intended for plant consumption are carried through the operations of inspection, first and subsequent operations in the same skid boxes in which they arrived from the foundry, and are tiered as necessary to conserve floor space.

When sheet stock, used for stampings, is received it is put on trailers in bundles weighing from 2000 to 2500 lb. These trailers are towed by the platform trucks acting as tractors. Bar stock also usually is handled in the same manner from receipt into raw—
(Turn to page 78, please)

"Made for
Each Other!"



SERVICE PISTON RING SETS BY MUSKEGON

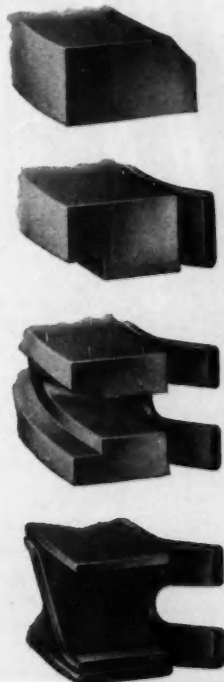
Muskegon works with engine builders to design piston rings especially for their specific engines. Thus each ring and its companion rings, each set of rings and its corresponding engine are indeed "made for each other" and work together to achieve the very maximum of performance, mileage, and economy.

Furthermore, Muskegon's facilities for the casting, processing, finishing, inspection, and packaging of these Service Piston Ring Sets are unparalleled.

These *Factory Approved* and *Factory Engineered* Service Piston Ring Sets are available from your car dealer or other authorized service outlets.

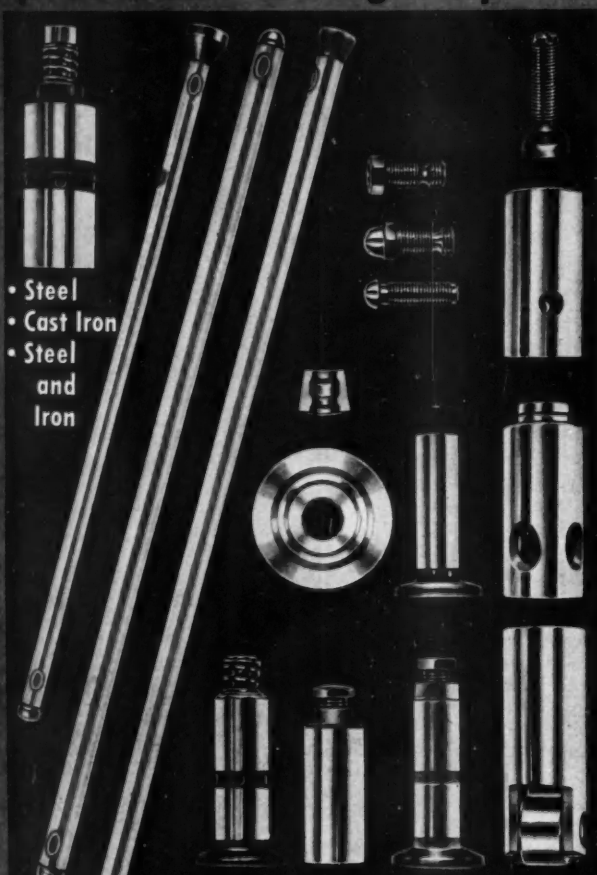


"THE ENGINE BUILDERS' SOURCE"



"CHICAGO"

precision valve gear parts



- Steel
- Cast Iron
- Steel and Iron

Hydraulic Tappets • Mechanical Tappets • Roller Followers • Push Rods • Self Locking and Standard Thread Adjusting Screws • Valve Spring Retainers • Split Valve Locks • Rocker Arm Shafts

Connecting Rod Bolts • Hydraulic Cylinder Pistons
Cylinder Head Studs • Cylinder Head Cap Screws
Main Bearing Studs • Main Bearing Cap Screws
Flywheel to Crankshaft Screws • Diesel Energy Cells
Wheel Bolts and Studs • Differential Carrier Screws
Oil Pump to Distributor Shafts • Remote Control Levers
Automatic Transmission Valves • Water Pump Shafts

Special Screw Machine Parts 1/16" to 3" Diameter • Tap Screws • Set Screws • Nuts • Washers • Taper Pins • Special Screw Products.

**The CHICAGO
SCREW COMPANY**
2801 WASHINGTON BLVD.
BELLWOOD, ILL.
Established 1872

material storage and, as requisitioned, both items are transported to stamping or screw machines by the powered trucks. In process work the material is handled in tote pans until it is finished when it is carried in special "insert" boxes. These are transported in multiple lots to the assembly and shipping departments.

Practically every item of material, when withdrawn from stock, is tagged with a "Move Ticket." Such tickets are renewed as the material moves through the production area. These tickets specify the destination of the load. Move orders on waiting loads serve as a signal to the operators of the powered trucks as they move about the plant. This system has been found to expedite trucking service, according to plant officials. Each department has a production control man, who is charged with the responsibility of issuing of the move orders. All powered industrial trucks used in the production area cruise through the entire shop, this plant-wide cruising system having been found to be more satisfactory than the allocation of trucks to specified departments.

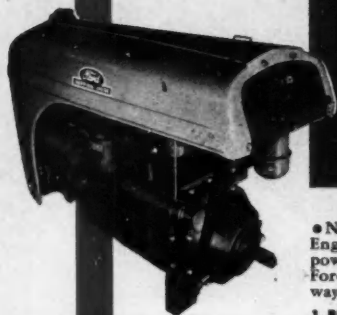
BOOKS...

NEW LESSONS IN ARC WELDING, published by *The Lincoln Electric Co., Cleveland, Ohio*. Price \$1.00. Containing 61 tested welding lessons plus 163 pages of practical welding information, this book gives lessons in welding mild steel, alloys, sheet metal and pipe; information on new procedures for better welding, automatic and semi-automatic, hidden arc welding, metals identification, joint selection and use of welding in making common machine parts.

GAS TURBINES, by *Harry A. Sorenson*, published by *The Ronald Press Co., 15 East 26th Street, New York 10, N. Y.* Price \$6.50. This textbook covers thermodynamic principles, elements of design, and general construction features of the gas turbine. It treats the gas turbine as a powerplant which can, through modifications in design and construction, be applied to many classes of service.

GAS TURBINES AND JET PROPULSION, Fifth Edition, by *G. Geoffrey Smith*, published by *Aircraft Books, Inc., New York 17, N. Y.* Price \$7.50. Along with a complete revision of material to bring the book up-to-date, there is much new material such as a special chapter on turbines for road vehicles. It gives a survey of the historical approaches to the subject, an explanation of the basic principles and theories involved and a summary of the design characteristics of complete units and components.

INTERNAL-COMBUSTION ENGINES, Sixth Edition, by *Lester C. Lichty*, published by *McGraw-Hill Book Co., 330 W. 42nd Street, New York 18, N. Y.* Price \$7.00. It contains a complete treatment of the combustion process and its application to the various engine devices. This edition has material on gas turbines, rockets, analysis of back pressure with exhaust-gas turbines and many other new features. Charts, illustrations and exercises are included.



Make FORD POWER your PROFIT-POWER!

• Now, more than ever, Ford Industrial Engines and Power Units mean "profit-power" for your equipment. That's because Ford Power is *right* three big profit-making ways:

1. Right Power—Ford Industrial Engines and Power Units are available in five great models from 120 cu. in. displacement to 337 cu. in. displacement . . . a four, two sixes and two V-type eights. Every unit is individually tested, ready to run.

2. Right Features—when you standardize on Ford Power you have available a complete line of special Ford equipment, mobile components and accessories to handle economically any operating condition.

3. Right Service—with Ford Power you are assured of efficient, accessible service, as near as the nearest Ford Dealer. He stocks replacement parts, too . . . no need for you to carry a large parts inventory. And convenient Ford Service cuts costly "down time."

For equipment with "profit-power," be sure to specify Ford Industrial Engines and Power Units.

*Here are some typical
Ford-powered defense applications:*

Pumps . . . Cranes . . . Earth Augers . . . Stone
Crushers . . . Compressors . . . Welders . . . and
many others.

Portable horizontal drilling machines made by the
Paris Manufacturing Co. of Paris, Illinois, are
powered with the Ford "120" Four Cylinder Industrial
Power Unit and use Ford axles and trans-
missions. Has drilling range to 40 feet.

**YOUR JOB IS WELL-POWERED
WHEN IT'S FORD-POWERED**

Ford

**INDUSTRIAL ENGINES
AND POWER UNITS**

INDUSTRIAL ENGINE DEPARTMENT
Tractor & Industrial Engine Division
FORD MOTOR COMPANY
Highland Park, Michigan

Our experienced Sales Engineers are at
your service in developing engineering
recommendations for the most efficient
use of Ford Industrial Power in your
application.

Industrial Engine Department, FORD MOTOR COMPANY
18080 Woodward Ave., Highland Park 3, Michigan

I am interested in Industrial Power for:

(State your application)

Send me new 1951 literature on Ford Industrial Power (cu. in. displ. and cylinders as shown).

☐ "120" 4-Cyl. ☐ "226" 6-Cyl. ☐ "239" V-8 ☐ "254" 6-Cyl. ☐ "337" V-8

Firm Name

(Please print)

Attention of

Street

City

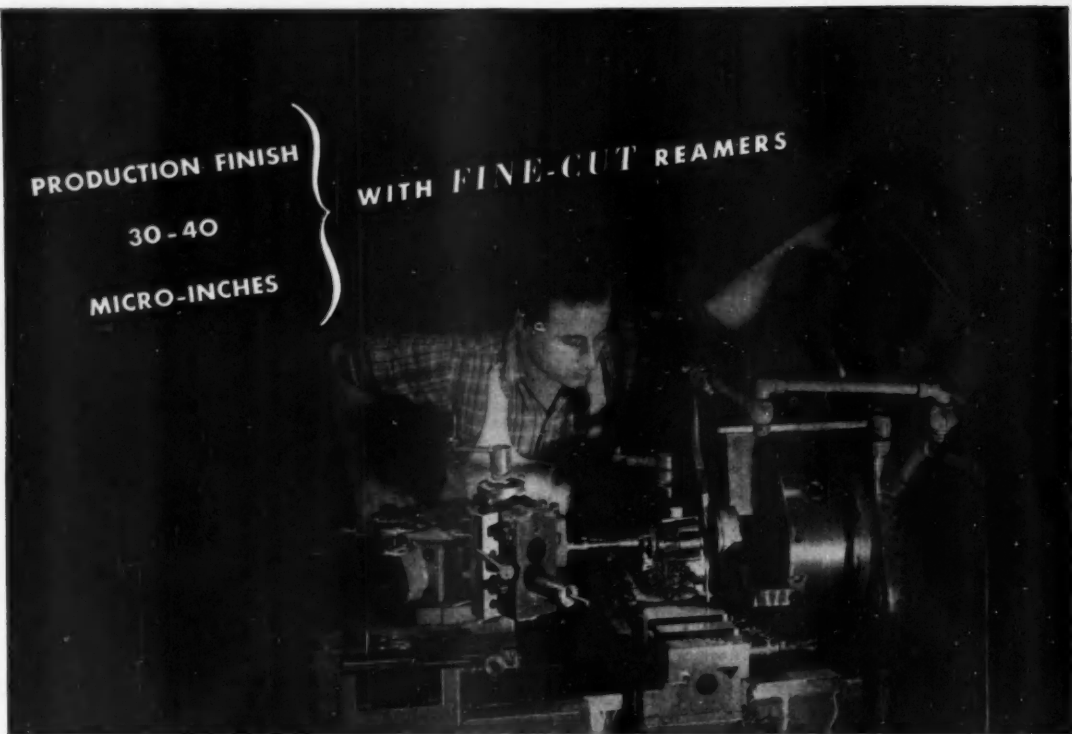
Zone State Q

PRODUCTION FINISH

30-40

MICRO-INCHES

WITH FINE-CUT REAMERS



You can ream finishes like this in *regular production* operations with Barber-Colman Fine-Cut Reamers. Many jobs which previously required finishing by lapping or honing are now being finish reamed with these Fine-Cut reamers. All elements for fine finish, accuracy and tool life are provided in the reamer design and application of Barber-Colman job-engineered reamer sharpening.

With assurance of this built-in control, more pieces can be finish-reamed before breaking the set-up for re-sharpening. In addition, the Barber-Colman blade mounting design combines outstanding tool life with ease of blade adjustment and absolute rigidity. That's why you outproduce—and outearn—conventional tool designs every time with Barber-Colman reamers.

A Complete CUTTER ENGINEERING SERVICE to Solve Your Metal-Cutting Problems



JOB-ENGINEERED DESIGN • FULL LINE OF STANDARD TOOLS • FIELD SERVICE

Barber-Colman

FINE-CUT REAMERS

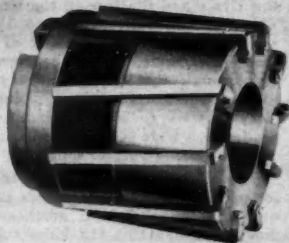
**ONE-CUT FINISH REAM 30-40 MICRO-INCH FINISH,
CUTTING 170 FEET PER MINUTE, USING .008" — .010" FEED**

No special tooling is required to get results like these. A standard turret-lathe set-up is used. The large number of blades in the reamers provides extra stability in the cut and smaller chip load per tooth, resulting in a very fine finish.

Front chamfer, secondary lead and back taper are specified for these particular job conditions by Barber-Colman Reamer Engineers to produce free-cutting and easy chip removal without scratching, back scoring or gouging.

If you are now choosing between accurate, quality-finish reamed holes — and low-cost production and reamer maintenance — you can have both, using Barber-Colman adjustable reamers. More blades per cutting diameter — blades solidly held in cutting position — Barber-Colman standard irregular blade spacing — these features produce tool room quality under production reaming conditions.

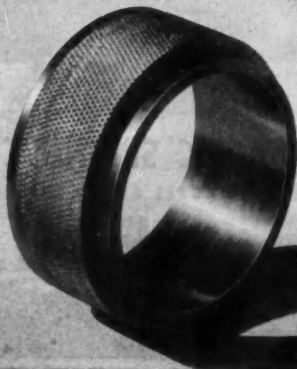
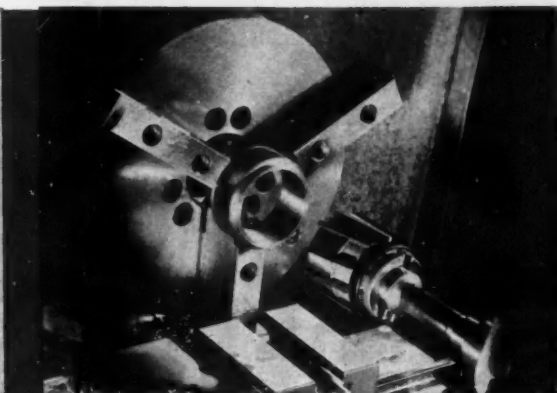
Send specifications on hole sizing and finishing problems to Barber-Colman engineers. They will furnish reamers to give you the desired quality consistently.



1. Reamer, held in turret lathe float, is fed to work revolving at 170 feet per minute, using .008"-.010" feed. Three thousandths stock is removed in a cut 2.68" diameter and 1-1/2" long.

2. Irregular spacing of ten reamer blades is arranged so that diameter size is easily checked across any two blades. Wedge mounting at bottom of blades permits more blades per reamer diameter — hence, finer finish.

3. Consistent 30-40 micro-inch finish is obtained on these precision boring head collars throughout the life of the reamer because of Barber-Colman job-engineered reamer sharpening.



Barber-Colman Company

GENERAL OFFICES AND PLANT, 609 ROCK STREET, ROCKFORD, ILLINOIS, U.S.A.

TRANSPORT...Russia's Achilles' Heel?

(Continued from page 43)

Maximizing Performance

Faced with the necessity of meeting rapidly-growing demand with limited resources for expanding capacity, the government has developed a variety of interesting devices for maximizing the performance of the carriers. The fundamental contrast between Soviet and American practice is that in the USSR

it is capital plant and equipment which is relatively scarce, while in the U. S. it is labor. Consequently the Russians have sought ways to economize in the use of capital, while we have substituted capital for labor. Put another way, the Soviets endeavor to maximize output per unit of capital equipment, while in this country it is possible to

be somewhat more lavish in the use of capital. This can be illustrated in a variety of ways.

The transport crisis of the early 1930's was surmounted, for example, through concentrating freight traffic on a handful of crucial trunk lines. As a result, the annual ton-mile output of line installations, rolling stock, and motive power on these arteries was enormously increased. It was possible to achieve this solution because of the geographical position of the principal sites of Soviet industrial activity.

The map on page 38 shows the location of the major routes. Down in the southwest corner will be seen two east-west lines between the iron ore at Krivoi Rog and the coal around Debaltsevo. These shuttles, together with the three routes north from there to Moscow, are the backbone of the eastern Ukrainian industrial complex, the Donbas. Their carrying capacity was substantially enlarged during the 1930's. Farther eastward, where the Trans-Siberian crosses western Siberia, a second coal-iron ore shuttle was established between Magnitogorsk in the Urals and Stalinsk in the Kuzbas. This too was built up in the 1930's, and then modified by the use of coal from Karaganda, located between the two termini. Three inter-regional trunk lines run from the Urals industrial complex west to Moscow and Leningrad; these were strengthened and are currently being further enlarged.

It was these routes, together with a series of lines from the Donbas northwest to Leningrad and northeast to the Urals, on which the industrialization program depended. All the other lines shown are important, but not to the same extent. The Trans-Siberian east of the Kuzbas, for example, was vital for building up the Soviet Far East, and on the eve of World War II it was double-tracked. At present, along with the Chinese Eastern lines through Manchuria, it is presumably the basis for a considerable flow of traffic. The other inter-regional routes shown are all important for various reasons which should be evident from inspection. Not shown on the map are a large number of lesser lines, mainly in European Russia, on which traffic is relatively light.

The trunk lines joining the major centers of industrialization noted above were seen to be the only ones needing immediate attention. All other lines were slighted, while the density of traffic, in ton-miles per mile of line per year, on the main routes reached levels quite respectable in American terms.

(Turn to page 84, please)



QUALITY CONTROLLED

PRECISION MECHANICAL

SPRINGS



AUTOMATIC SPRING COILING CO.
4048 W. THORNDALE AVE. • CHICAGO 30, ILLINOIS





On Tap—Tooling for Tough Government Orders

There's scarcely a mass production threaded part on government contract lists for which we haven't worked out standardized Vers-o-tool procedures that guarantee high precision, top output and lower threading costs.

- Vers-o-tools are simply designed, with fewer parts than any other self-opening die; they are hardened and ground throughout—high precision tools.
- These Vers-o-tools with ground-thread-form circular chasers produce smoother threads consistently. The Namco micrometer gage quick-checking of thread form before and after each chaser grind insures thread uniformity, saves time, eliminates scrap.
- Vers-o-tool circular chasers last longer—as much as 50 times longer. They're regrindable through a full 270° of circumference. Chasers and holding blocks are also interchangeable, size for size, between revolving and nonrevolving styles of Vers-o-tools. Chaser inventories are kept at minimum.

We're ready to help you—right now—with the right answers to your critical threading problems. New catalog—D-51.



JOB FACTS

- | | |
|-----------------|--|
| PART | —4½" diam. forged brass coupling. |
| THREAD | —6 pitch American National Hose with "Higbee" thread at start, to eliminate partial threads, make quick connections. |
| MACHINE | —Goss & DeLeeuw Chucker. |
| DIE HEAD | —5½" style DR Vers-O-Tool, with 5 combination ground thread and turning chasers to give "Higbee" start. |
| PIECES | —2000 per grind, or better, with Namco Ground Thread Circular Chasers. |

NC & NF, taper and straight American Briggs and dry seal chasers usually are shipped from ready stocks.

The NATIONAL ACME CO.

170 EAST 131st STREET • CLEVELAND 8, OHIO

*Acme-Gridley Bar and Chucking Automatics:
1-4-G and B Spindle • Hydraulic Thread
Rolling Machines • Automatic Threading Dies
and Taps • The Chronolog-Limit, Motor Starter
and Control Station Switches • Solenoids
Centrifuges • Contract Manufacturing*

Engineered to your production

Schmieg

CENTRI MERGE

OVENS



Any Size, Shape, Type FOR EVERY KIND OF WORK

Whatever your requirements, Schmieg drying and baking ovens are designed and engineered to give you highest efficiency at lowest operating and maintenance cost.

Conveyor or box type, for any installation arrangement, compactly designed to save valuable floor space, engineered to fit smoothly into your production plan, Schmieg ovens make it easy for you to turn out the very best paint jobs.

Schmieg ovens give you automatic temperature control, insure against hot spots, are meticulously insulated to prevent heat loss. Every operating essential has been carefully designed and engineered to enable you to safeguard product quality.

So we say—No matter what size, shape or type of oven you may need, for any kind of work, Schmieg ovens give you most for your money.

Consult Schmieg engineers today.

THE *fast* AIR PURGE
CENTRI MERGE

Schmieg

INDUSTRIES INC.
Engineers & Manufacturers

Achilles' Heel?

(Continued from page 82)

There was enough capital investment on these key lines to raise their technical features to fairly up-to-date standards, and they were then made to carry freight on a scale never before experienced in Russia. The trains run very slowly by our standards, but with great frequency.

Raising Equipment Productivity

In a drive to raise the productivity of motive power and rolling stock, the railroads have emphasized the use of whole freight trains, loaded at a single point with some mass freight such as coal, preferably all consigned to a single destination. If it proves possible, as it occasionally does, to load these cars again at the terminus with a single commodity consigned entirely to the original starting-point, the railroad accomplishes its ideal! Note that cars need never be uncoupled or sorted at any intermediate classification yard, and that costly terminal operations are minimized. Some three-quarters of railroad freight ton-miles consists of primary raw materials and fuel, while less-than-carload freight, characteristic of a consumer-oriented economy, plays a relatively small role. This form of mass production in transportation is thus more feasible than it would be in the United States. However, it creates other problems in allocating rolling stock and locomotives and maintaining them in constant use. And of course it tends to concentrate the location of rolling stock at any given time.

It will be seen that although the railroads can lower their own operating costs by using these trainload methods, they create difficulties for shippers and receivers, who have to deal with intermittent large consignments rather than a steady flow of smaller shipments. This approach of the railroads also runs counter to the regional self-sufficiency drive, which tends to produce small, scattered clients who send and receive freight on a smaller scale.

In order to minimize the time that rolling stock is unproductively idle, the railroads use very strong methods in dealing with demurrage on freight cars. Average turnaround time in the USSR is only about 60 per cent of what it is in the United States, largely because the clients of Soviet railroads are induced to load and unload promptly. Soviet freight cars cannot be used as auxiliary warehouses. Fines for delay begin after a few hours, usually, and cumulate rapidly. In cases of excessive delays, the responsible officials, both of the railroads and of industrial enterprises, can be given

(Turn to page 86, please)

No ONE chain serves every purpose

LINK-BELT offers the right chain

... engineered for
your requirements

Don't settle for a "cure-all" chain to handle every job. Different types of chain have different characteristics. That's why Link-Belt makes the most complete line of chains in the world. Our engineers can recommend the exact type of chain to fit your particular needs . . . the one that does your job best.

Equally important is your assurance that *any* chain with the Link-Belt name will give you longer chain life. Exact control of raw materials and processes . . . plus manufacturing refinements add up to the highest standards.

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices, factory branch stores and distributors in principal cities.

17,300-P

LINK-BELT
CHAINS AND SPROCKETS



Link-Belt chain conveyors, continuously or intermittently operated, help to reduce delays and increase production in assembly operations.

Typical chains from
the complete
LINK-BELT
line



Class H Pintle chain—excellent for conveyors that slide, used plain or with attachments.



Class C combination chain—popular, durable, low cost design for elevators, conveyors.



Class SS bushed roller chain with offset sidebars—for heavy drive service at moderate speeds.



Link-Belt "Flint-Rim" cast sprockets, give extra long life. Cast steel sprockets are also available for most severe service.

TRANSPORT... Russia's Achilles' Heel?

(Continued from page 84)

prison sentences ranging up to five years of "correctional labor."

The emphasis in transport operations, for trucking and shipping as well as for the railroads, is on continuous operation. This means in general that equipment is subjected to very strenuous use, violating American standards in ways which American technicians sometimes find hard to believe. The pressure for production

leads also to an over-riding of what we would consider proper standards of safety for labor. The important point is that impressive results are achieved, though at costs, in terms of both lives and equipment, which from our point of view are too high.

Basic Transportation Difficulties

If an American transport executive were transplanted to the USSR, he

would soon recognize several fundamental difficulties facing Soviet transportation. The most pervasive is the climate. The Black Sea is in the same latitude as the Great Lakes; one has to think of Canada rather than the U. S. in imagining Soviet transport conditions. Not only do rivers and seas freeze, but railroads are slowed down, road-building and maintenance are made much more difficult, and air transport is seriously hampered. It is well when looking at a map of the USSR to remember that huge portions of the land mass are so far north as to be essentially unusable with our present technology.

Another fundamental difference between the two economies, which may not be permanent however, is that in the USSR, petroleum and its products are far scarcer, relative to the other basic resources, than in the United States. This has meant, in turn, that steam power and electric power have dominated the transportation field. Electric motive power on the railroads has been given more attention in Russia than in the U. S. for many years. There is now some development of Diesels, but only for showpiece passenger trains, and for one or two desert lines in Central Asia. With petroleum at present in such short supply, and considering the demands of military aviation, it does not seem possible that the USSR can plan to expand its highway carriers to play a role comparable to the one played by inter-city trucking in the United States. On the other hand, a new series of oilfields in the "Second Baku" area between the Volga and the Urals has been developed in the last fifteen years, and several more such fields may be discovered in the future.

The third basic problem faced by the major Soviet carriers is related to the nature of their capital plant and equipment. As shown by Shimkin in his articles on "The Automotive Industry That's Behind the Iron Curtain" (AUTOMOTIVE INDUSTRIES, February 1, February 15, April 1, 1948), a large part, even of currently-produced equipment, takes the form of models considered obsolete in this country. This applies also to the railroads. The inventory of motive power, for example, contains a large fraction of old and small locomotives. They are still useful on all those portions of the railroad network where rails, roadbed, and structures will not support the heavier models produced in the 1930's. But even the new models, such as the post-war Series L (Pobeda) locomotive, are adaptations of quite antiquated Western designs. In river shipping too, it appears that the fleet is made up very largely of old-style equipment.

The mixture of new and old is well illustrated on the railroads by signaling facilities. Over half the network still uses an electrified version of the

(Turn to page 88, please)



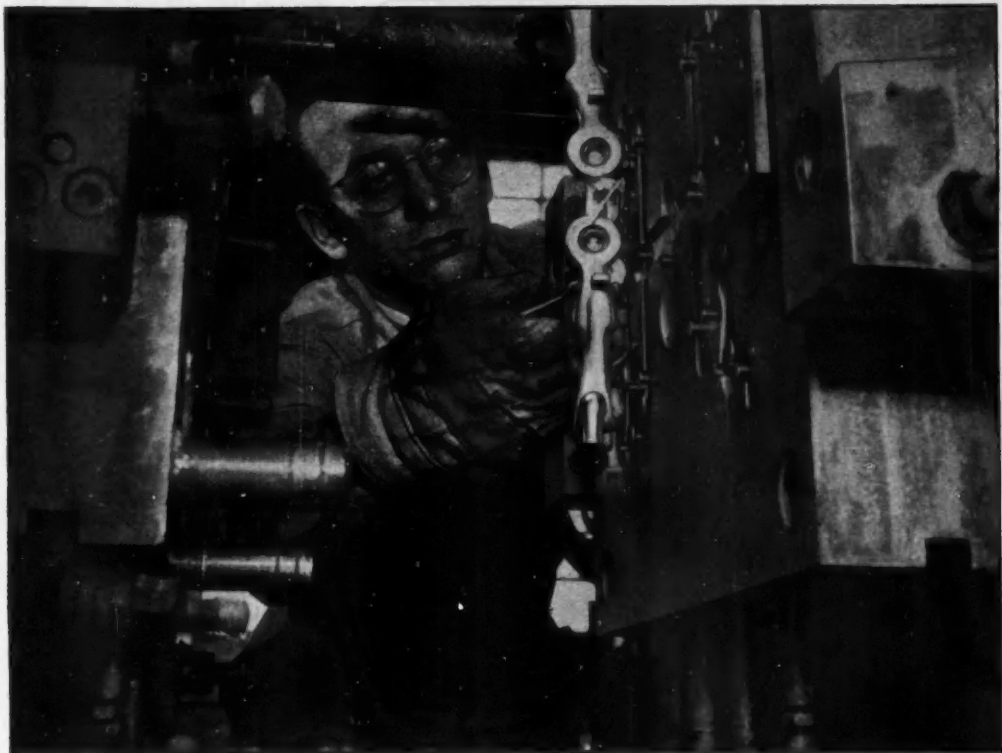
VULCAN
means
improved
diaphragms
for
automotive
equipment

AFTER exhaustive and revealing tests have demonstrated the superiority of VULCAN special-purpose diaphragm materials, many of the leading automotive part manufacturers are now switching to VULCAN diaphragms. Wherever diaphragms are used—as in fuel pumps, vacuum booster pumps, dashpot mechanisms and others, these materials excel in performance. They are highly resistant to gasoline, aromatics, oils, alcohols, butane, propane and solvents. They also provide high tensile and burst strength. They insure long life in continuous service. Investigate these new, improved diaphragms. It will pay!

VULCAN  **RUBBER**
PRODUCTS, INCORPORATED

FIRST AVENUE AND 38th STREET, BROOKLYN 20, N. Y.

Pacific Coast Representative: GORDON Z. GREENE CO., 2335 E. 8th St., Los Angeles 21, Calif.



Thousands or Millions....

**ALUMICAST can produce quality castings
in quantity, exactly to your specifications**

Let ALUMICAST give you a helping hand with your casting problems. You'll be agreeably surprised with the results if you ask our nationally recognized authorities in research, metallurgy, engineering and production to put their know-how to work for you.

Here at ALUMICAST, we have the most modern laboratory and production equipment to make permanent mold and die castings in aluminum or magnesium. Every step, from ingot to casting, is rigidly regulated. The quality of ALUMICAST castings is outstanding because

of expert scientific control. This value, we call "E.S.C.", is of great importance to you. It helps make good products better.

No matter where you are located, you are cordially invited to consult us about your casting requirements for civilian or defense needs. We have sales engineers and representatives in leading cities. If you do not know the name of our man nearest you, write direct to us. ALUMICAST CORPORATION, 1521 N. Kilpatrick Avenue, Chicago 51, Illinois.

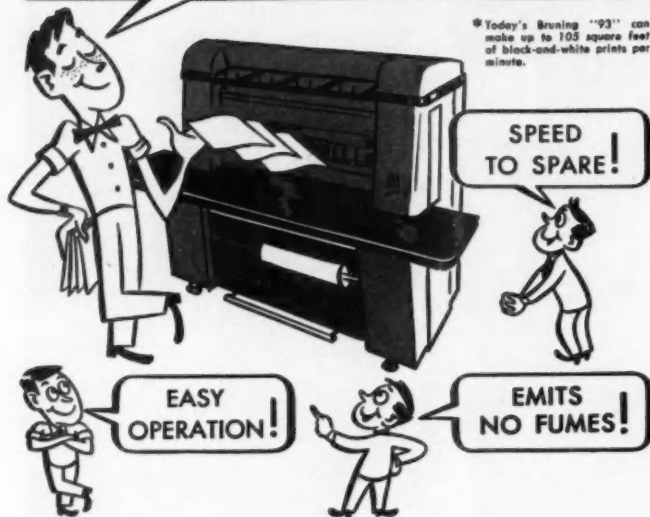
ALUMICAST

ALUMINUM and MAGNESIUM PERMANENT MOLD and DIE CASTINGS

"E.S.C."

EXPERT
SCIENTIFIC
CONTROL

STEP RIGHT UP AND GET YOUR PRINTS ON TIME*



Outgrown your present black-and-white print equipment?
Meet today's Bruning—it makes other machines look slightly
horse-and-buggy. It's the talk of the trade!

TALK ABOUT VOLUME... with a Model 93 Bruning you can print up to 105 square feet per minute! And that's *finished* prints—prints that come out flat, dry, neatly stacked, and ready for immediate use.

TALK ABOUT EASY OPERATION... since Bruning BW machines use no vapors and emit no fumes, they require no special exhaust installation. You merely connect them to your electrical circuit and you're ready to make prints. And when a Bruning machine is rolling, all you do is set the desired speed and feed in the paper. That's all. No trained operator is needed.

TALK ABOUT EASY MAINTENANCE... all essential bearings are permanently lubricated—also self-aligning. The adjustable

speed drive is a patented, stepless transmission that runs for years without attention. Parts that do require occasional attention are accessible in minutes.

TALK ABOUT FLEXIBILITY... Bruning BW machines can handle any black-and-white print jobs, and six different models offer a complete range of speeds and capacities. Too, there are 85 varieties of Bruning sensitized papers, films and cloths—far more than any other manufacturer offers.

SEE FOR YOURSELF the speed and ease of operating a Bruning BW machine. It's an eye-opener even if your present equipment is just a few years old. A complimentary demonstration, or our explanatory booklet, is yours for clipping the coupon.



The revolutionary, new
BW Copyfax model.

BRUNING

Specialists in copying since 1897

CHARLES BRUNING COMPANY, INC.

Dept. Y-91 100 Reads St. New York 13, N. Y.

☐ Please send me your free booklet A-1053A.

☐ I would like to see a Bruning BW machine demonstrated.

Name _____ Title _____

Company _____

Street _____

City _____ Zone _____ State _____

venerable train-staff system, with only the major trunk lines using automatic block signaling. There has been a short experimental section using centralized traffic control since the eve of World War II, but the system is not yet prevalent. In general, equipment and methods which require relatively large amounts of labor still prevail in transportation, due to the shortage of capital.

Shortage of Trained Workers

American transport can draw on an experienced and well-trained labor force for its personnel, while in the USSR this essential component of an industrial economy has only been created in the last two decades, and still is very young. It appears that a small but highly competent body of trained engineers is available for the key sectors of the economy, but in the middle and lower ranks the evidence indicates that the USSR suffers from inadequately trained labor. In the decade before the war it was necessary to train millions of peasants who lacked any previous experience with machinery. During the war, large numbers of those trained were lost. Since then, great efforts have been made to train young boys and girls for industry and transport, but as any transport official knows, modern transport operations require mature and experienced workers for maximum effectiveness. Although the evidence is not abundant enough to be conclusive, it is usually concluded abroad that Soviet labor productivity suffers from an inadequate standard of living. Even well-indoctrinated citizens may find it hard to maintain maximum productivity under fairly grim living conditions.

In all these respects then, unfavorable climate, limited petroleum supplies, poor equipment and inexperienced personnel, Soviet transport agencies suffer by comparison with the United States.

Postwar Soviet Programs

Having surveyed general Soviet transport policy, and the basic difficulties confronting Soviet carriers, we can now turn to an examination of the specific problems which have arisen since World War II.

The first, naturally, grew out of the severe damage suffered by all transport facilities in the occupied part of European Russia. The Nazis employed one machine to snap ties and plow up roadbed, and another to chop out sections of rail or dislodge and twist them. Yards and terminal facilities were wrecked, signaling equipment removed, bridges blown up, and servicing installations ruined. Ports and river landings were similarly damaged.

One of the surprising things about the Soviet advance from Stalingrad to Berlin was the rapidity with which
(Turn to page 92, please)

"Job-Fitted"

ABRASIVES

are **BESLY's** answer
to today's
production conditions

*More Grinds Per Wheel
Deliveries In Just a Few Days
Full Usage of Abrasive
Fast, Cool Cutting
Less Frequent Dressing
Fewer Wheel Changes
Longer Wheel Life*

Changing production schedules mean new products, substitute materials and altered specifications. Each can be handled correctly by abrasive modifications. Besly representatives know products, materials and processes—especially how to maintain high uniformity in production grinding—with every piece the same. Write us to have a Besly-Titan field engineer discuss your grinding needs . . . and ask for a catalog.

IT COSTS NO MORE . . .

In meeting today's high production demands, it's vitally important to work with abrasive discs and wheels best suited to *your specific needs*. Besly is able to supply you with compounded-to-specification abrasives that will do many jobs better . . . and you can count on deliveries in a matter of *days*—not weeks as might be expected. It pays to have your job specifications filed with Besly for same-week delivery of *made-to-order* wheels and discs.



BESLY-TITAN Custom-Made Abrasive Wheels and Discs



TAPS—the world's most accurate tap.

TWIST DRILLS AND REAMERS—Complete line for every need.

BESLY-TITAN ABRASIVE WHEELS AND DISCS—individually formulated for your job.

GRINDERS that reduce cost in every type of surface grinding.

CHARLES H. BESLY & COMPANY • 118 N. Cleton Street • Chicago 6, Illinois • Factory: Beloit, Wisconsin

The 1st installment

of the RAMSEY STORY

appears in the September 3 issue of



In the Automotive Industry there are scores of sagas of American invention and progress which are practically unknown to most Americans.

It is our belief that the best interests of the Automotive Industry will be served by making these stories better known.

Through the telling of these stories, Americans will gain a new appreciation of why the Automotive Industry, year after year, delivers increasingly more for the money and ever finer automobiles, trucks and tractors.

Americans will more clearly understand how all of these extra values which are delivered by the Automotive Industry could be developed only under the American system of free enterprise.

Finally, through stories such as the Ramsey Story, the public will come to have a better understanding of the importance of maintenance. They will learn why low-cost maintenance is one important reason the automobile and truck are in such universal use in America today.

That is why we, of the Ramsey Corporation, have determined to begin the telling of the Ramsey Story through the pages of LIFE Magazine. Reproduced on the facing page, in reduced size, is the initial installment. Further installments will appear in LIFE from time to time.

LIFE Magazine with its 5 1/3 million circulation is said to reach, in the course of 13 weeks, over one-half the population of the United States. We hope that you will be among this vast audience and will find in each installment of the Ramsey Story something of interest to you and of value to the Automotive Industry.

Ramsey Corporation

St. Louis, Missouri

Subsidiary of Thompson Products, Inc.

G-3683-RAM



You can thank **RAMSEY ENGINEERING** for a Fountain of Youth in a Steel Spring

Are you one of 30 million who drive a car, truck, bus or tractor with a re-powered engine?

Then, the chances are your re-powered engine owes its life to a spring of steel that Ramsey Engineering led in pioneering years ago. It is this spring that does for man's engines what Ponce de Leon failed to do for man.

This spring of steel is an inner-ring. It is placed between the piston and piston ring. It compensates for the wear... makes worn parts function almost like new.

Today, this inner-ring principle is universally recognized as the way to restore lost engine power due to wear!

Today, you benefit... save expensive repair jobs... get lower cost operation... add years to the life of your engine and get more for your used car... because years ago Ramsey was the leader in pioneering this inner-ring principle.

Today, this principle logically finds its highest expression of perfection in Ramsey-produced piston rings. It should because:

Ramsey has built millions more rings than anyone else employing the spring inner-ring principle to reduce wear by stabilizing the piston.

Ramsey has invested more years engineering specially designed oil and compression

rings to get maximum efficiency out of the steel spring inner-ring principle.

Ramsey has utilized the principle so effectively that today piston rings with the spring inner-ring find application in new engines as well as worn ones.

Ramsey has spent more years engineering special machinery to make these rings to greater precision and at a faster rate of production.

Yes, thanks to the "fountain of youth" in a steel spring inner-ring... thanks to Ramsey Engineering Leadership... the gasoline engine today is a more efficient source of energy with a longer, more economical life of usefulness.

Makers of **RAMCO 10-Up Piston Rings**, Ramco Inner-Rings, Ramco Piston Skirt Stabilizers,

Seal-Tite and Oil-Tyte Piston Rings, Spiralex Retaining Rings, Spire-Seal Grease Seals and Dust Seals, and special rings for Automotive and Industrial Applications. Factories: St. Louis and Sullivan, Mo.; Fruitport, Mich.; Toronto, Canada. Ramsey Corporation.

General Offices: St. Louis, Mo., a Subsidiary of Thompson Products, Inc.

G-5683-SAE



SETTING NEW AND HIGHER STANDARDS FOR HARNESSING ENERGY TO MAKE ENGINES AND MACHINES BETTER SERVE AMERICA

(Continued from page 88)
transport lines were put back into operation. Emergency makeshifts were devised which made it possible to supply the front across a steadily widening band of devastated country. Thus by mid-1945 the transport system was already partially restored.

However, much remained to be done. Major arteries, for example, generally had only a single track in operation, so that a great deal of re-double-tracking was necessary. Rebuilding of classification yards, locomotive depots, water towers, etc., on a permanent basis was also required. Hundreds of items in the Soviet press indicate that

these tasks were for the most part carried out by the end of 1948. In 1950 there were many reports that new passenger stations were being completed, an indication that higher-priority jobs had been finished. The evidence indicates, therefore, that in the west the transport system cannot be assumed to be weaker than it was in 1940, and may well be stronger.

A second set of wartime problems arose in non-occupied Russia, where new loads were placed on the transport system, especially the railroads. Plants and workers were transferred to the cities along the Volga river and farther east to the Urals, Central Asia, and

beyond. During the war it was necessary to raise the carrying capacity of several arteries through double-tracking, installation of better signaling, etc. In 1946, an ambitious program of expansion and improvement, carrying this process farther, was announced for the 1946-1950 period. It involved not only the building of new lines, but extensive electrification and double-tracking of existing lines with heavy traffic.

The two most publicized projects were the South Siberian line and the Mointy-Chu line. The first consists of six new lines and five old ones which will form a through route from the Volga to eastern Siberia. It had been hoped to have two of the six new lines finished by 1950, but in fact neither one was, and the others have scarcely been started. The Mointy-Chu line will connect the coal at Karaganda with Central Asia to the south. Track had been laid by the end of last year, and the line will probably be ready for permanent operation by the end of 1951.

Electrification Behind Schedule

The electrification and double-tracking projects have not been reported on very extensively, but it appears that the former are far behind schedule. It was proposed to electrify about 4000 miles of line around the Urals, a program which will take several more years for completion. If the program here and in other parts of the country is eventually carried out, the USSR will have a great deal more long-distance electrified railroad line than has seemed feasible anywhere else in the world. The double-tracking projects are probably more nearly on schedule. In a few more years it will be generally true that in the newer parts of the USSR, where the rail network is very sparse indeed, all the major inter-regional trunk lines will have double tracks. American railroads, on the other hand, running fewer but much faster and heavier trains, and with more advanced signaling systems, have developed ways of making single-track line extremely effective.

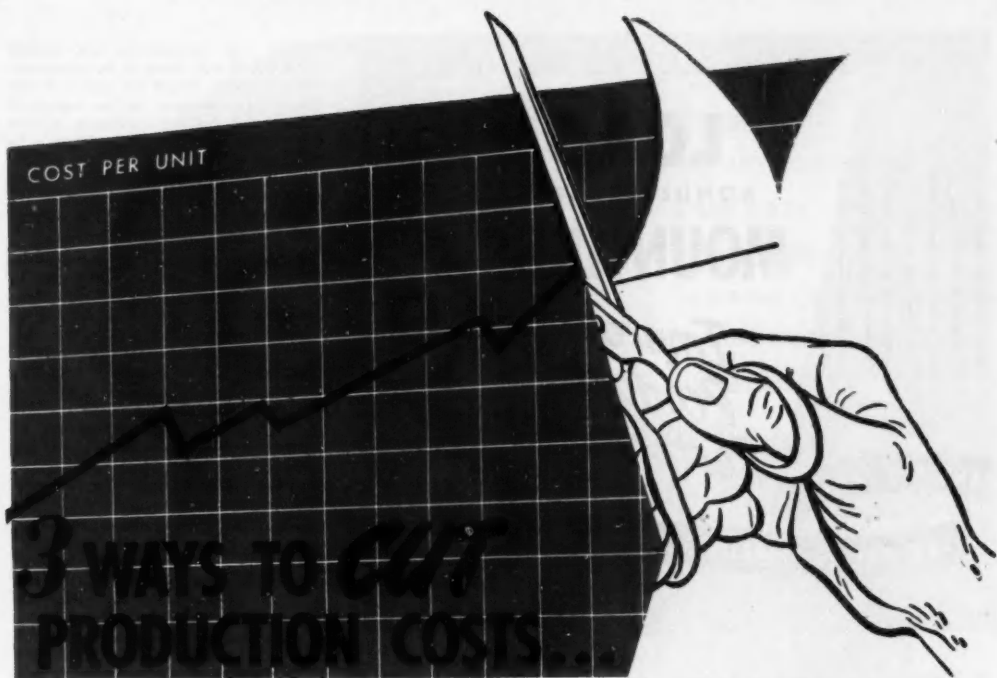
The extension of the Soviet sphere of influence as a result of World War II has raised a new problem—coordination of Soviet transportation with the rail network of eastern Europe and the Far East. The Soviet railroad system uses almost entirely a five-ft gage, while in eastern Europe the standard four-ft, 8½-in. gage prevails. This means either that one of the two systems must be converted, or that trans-shipment points along the western frontier of the USSR must be expanded to handle an increased volume of traffic. It will be evident that conversion of existing facilities would require a colossal quantity of new investment. Not only would track have to be relaid, but bridges, tunnels, station platforms, roundhouses, etc., would have to be

(Turn to page 94, please)

Tung-Sol Signal Flashers

more than 10 million used
in 13 years—most of them
outlast the cars they're on
—that's dependability!

TUNG-SOL LAMP WORKS INC., Newark 4, New Jersey
Sales Offices: Atlanta • Chicago • Dallas • Denver • Detroit • Los Angeles • Newark



WITH PERMITE ALUMINUM CASTINGS



PERMITE

Why not write us
about your castings
requirements
and get our
recommendations
and quotations?

A change from heavy metal to lightweight Permite Aluminum Castings can bring you these definite cost cutting savings:

1. Save on Cost of Handling

Permite Aluminum Castings are approximately 60% lighter than cast iron and 65% lighter than steel, brass and bronze. They're lighter to handle, lighter to assemble, lighter to ship as a finished product. So you cut handling costs all along the line!

2. Save on Cost of Finishing

The consistent uniformity of Permite Aluminum Castings within close tolerances makes only a minimum of machining necessary. Higher machine speeds and deeper cuts are practical with Permite Aluminum Castings, with only slight changes in tool contours. Time spent per unit in shaper, drill press or milling machine is appreciably less! And aluminum stays bright without painting or expensive plated coatings.

3. Longer Service, Fewer Replacements Mean Long-Range Savings

High tensile strength; resistance to corrosion; rapid heat transfer; and special to-fit-the-job designing by Permite engineers enable Permite Castings to give longer, better service! You save three ways with Permite and get better appearance, a better product.

ALUMINUM INDUSTRIES, INC.

CINCINNATI 25, OHIO

ALUMINUM PERMANENT MOLD, SAND and DIE CASTINGS...HARDENED, GROUND and FORGED STEEL PARTS



LORD
BONDED-RUBBER
MOUNTINGS

*Improve
Product
Performance*

ANOTHER REASON
FOR MAKING VIBRATION-CONTROL PART OF DESIGN

● There is a solution to the problem of undesirable vibration—LORD Bonded-Rubber Mountings. The result . . . improved product performance in many ways. LORD Mountings make mechanical equipment smoother . . . quieter . . . easier to operate . . . easier to sell. They protect precision and accuracy . . . increase personnel efficiency and production . . . prolong service life and reduce maintenance costs . . . save vital material . . . cut scrap loss.

LORD Mountings have been found indispensable for hundreds of modern products. They offer many advantages for the simplification of design, reduction of weight, speedier and more economical assembly, and greater operating efficiency.

To attain these performance improvements, vibration-control should be planned as an integral part of your product. LORD Engineers will assist you to most effectively adapt flexible mountings to your designs . . . select mountings of proper type, size, and deflection . . . position the mountings for greatest effectiveness.

Whether you make sensitive instruments or massive machinery, it will be to your advantage to make LORD Vibration-Control part of design. For improved product sales appeal, bring your vibration problems to LORD . . . Headquarters for Vibration-Control.

LORD MANUFACTURING COMPANY, ERIE, PA.



**Vibration-Control Mountings
... Bonded-Rubber Parts**

rebuilt, and locomotives and rolling stock would also have to be converted. Some changes would be easier if the Soviet system were to be narrowed than if the eastern European system were to be widened, but neither is to be expected in the foreseeable future. The Soviet Minister of Transport wrote in 1946 of developing a number of trans-shipment points, and this seems to be the solution being followed.

There has been talk of attempts to lay an additional rail so that trains of both gages could use the same roadbed. This, however, is impossible, for 3½ in. does not leave enough room for rail heads and wheel flanges, particularly since some play is needed in negotiating curves. On the whole, it appears that apart from changing over a single line to Germany and perhaps one or two in the Balkans to wide-gage, the Russians will rely on border trans-shipment points to unite the two railroad systems.

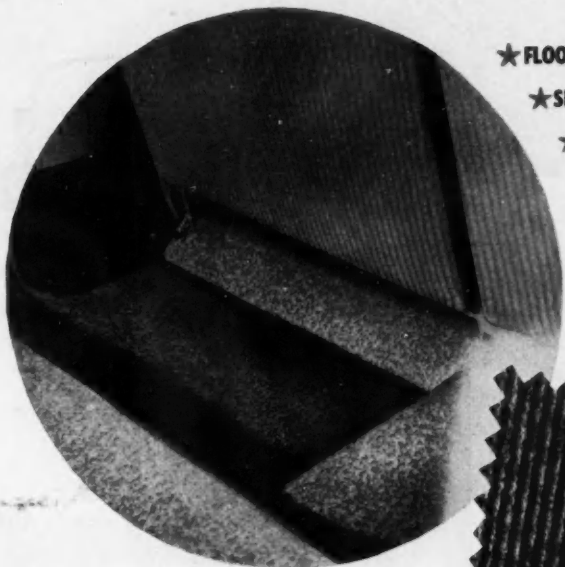
In the USSR itself, about 2800 miles of narrow-gage line are operated, mainly in the Baltic Republics and in western Ukraine. The latter are used to bring sugar beets to refineries. Probably this trackage will gradually be converted to broad gage, as was done in the 1920's and 1930's with many short lines in the Urals and other mining areas.

In the Soviet Far East the last decade has seen the construction of several branch lines down into Mongolia and in the territory above Vladivostok. When the Japanese were in Manchuria, they built several lines in the region north of Korea, lines which in the last year have been used against the UN forces. It was announced this spring that Soviet and Chinese railroad administrations had concluded arrangements for through communication between the two rail systems, covering both freight and passengers. This seems to imply a heavy volume of traffic.

Conclusions

What can be said about the present and future prospects for Soviet transportation under a government with the foregoing policies? The regime is continuing to build up heavy industry and national defense, which simultaneously increases the demand for transportation and limits the resources available for meeting this demand. Since the war there has been no evidence that another transport crisis was being allowed to arise. However, in the parallel growth of industry and transportation, the carriers have not been permitted to build at all in advance of the increasing demands placed on them. Just in the last year, five large-scale dam and canal building projects have been launched. They are the current center of attention, and will probably divert construction materials and labor from

(Turn to page 98, please)



★ FLOOR CARPETING

★ SEAT FACING

★ HEEL AND TOE CARPETING

★ KICK PLATES

★ SHELF LINING

★ LUGGAGE COMPARTMENT LINING

★ GLOVE COMPARTMENT LINING

★ HEAD LINING



Bur-Tex

No. 180

***Plastic-Coated* FELT CARPETING**

There are many reasons why you should be interested in this long wearing, improved, low-cost trim material:

It is **ATTRACTIVE, TOUGH, FLEXIBLE, EASY to CLEAN, EASY to INSTALL, and ECONOMICAL.** The material can be supplied in cut parts ready for quick, easy installation.

Sound-absorbing, sound-deadening modified jute base is plastic coated to make an attractive appearing surface, easy to wash and keep clean. Resists gasoline, motor oil, alcohol and other common solvents.

Available in many combinations of colors to suit your styling requirements.



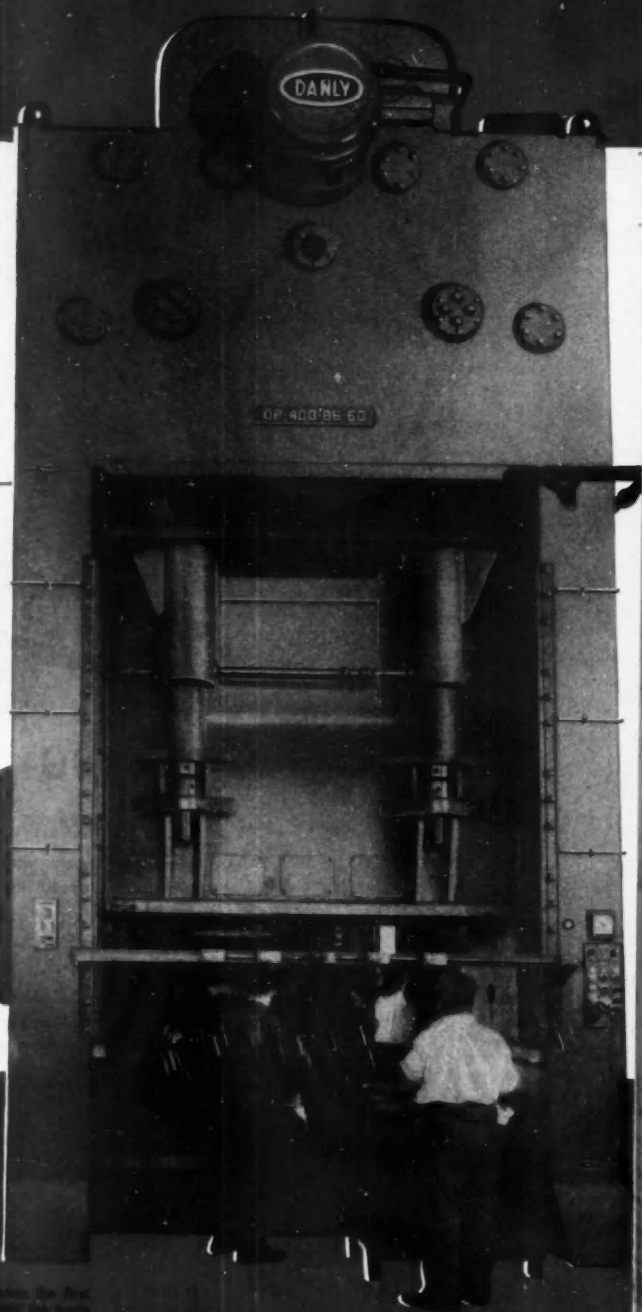
Bur-Tex

BURLINGTON MILLS INCORPORATED
BURLINGTON
WISCONSIN

Stephenson Building
DETROIT, MICHIGAN

DANLY PRESSES

BUILT
TO BEAT
PRODUCTION
RECORDS!



HEADING THE LINE . . .

This 400-ton Danly Double Action Press performs the first drawing operation on a variety of shapes, setting the pace for the entire line. Clear access to the die area speeds die changing.

**...at the Marion Industries
Division of Motor Products
Corporation, Marion, Ohio**

Ability to meet emergency schedules . . . to keep running day after day under maximum load conditions . . . is built into every Danly Press. Exclusive design features like the Danly Cool-Running Clutch and extra rigid, precise construction throughout assure longer uninterrupted production runs—less down time for routine maintenance.

That's why you find more and more *complete lines* of Danly Presses in leading stamping plants like this. Smoother, quieter and easier to operate, Danly Presses are preferred by press room personnel too!

Call a Danly Engineer today and see how Danly Presses, engineered to meet your specific requirements, will make your press room more efficient.

DANLY MACHINE SPECIALTIES, INC.

2100 South Laramie Avenue
Chicago 50, Illinois

Mechanical Presses . . . 50 to 3000 tons



Straight Side



Autofeed



Gap Frame



Double Action



Underdrive



PRODUCTION FLOW . . .

where a sequence of stamping operations is performed continuously on a line, each press is vitally important. Every press in the two lines shown here is a Danly.



EXTRA SAFETY . . .

Danly Press Controls protect operators and equipment, too. Here, two operators independently feed separate dies in the same press with maximum safety. In this setup, it is required that each operator engage two run buttons during most of the down stroke before the press will complete the cycle.



IT COSTS LESS TO RUN A DANLY PRESS

(Continued from page 94)
some portions of the transport building program.

It is apparent, on the other hand, that the opening up of undeveloped areas in the USSR cannot proceed without provision of transport facilities. On this count alone, many thousands of miles of railroads, highways, air lines, and river channels will have to be made available in the coming decade. During the 1930's the inherited network did not have to be greatly expanded to cope with demand concentrated in established centers. From now on, a larger proportion of pioneering lines will have to be built. These

will have the relative disadvantage of being more expensive to build and of producing less traffic in early years than supplementary lines in settled regions.

Growth of the Russian highway system is greatly handicapped, as compared with American experience, by the fact that it is not being financed by passenger automobile traffic. In the United States it has been public interest in highways for travel purposes, and public willingness to pay state taxes for their construction, which have pulled the program along since World War I. In the USSR no such stimulus exists. If roads are surfaced

or newly built, it is because government aims require it, not because Soviet citizens wish to travel. The chances are that roads will not proliferate as rapidly under the Soviet governmental program as they did in this country in response to the pleasure-driving public's demand.

There is another barrier to Soviet highway building which lies in Russian climate and topography. A continental climate, with extremes of heat and cold, enormously complicates highway maintenance. In many parts of the country there is said to be a shortage of good road-building materials. Level country on which rivers flood widely presents difficult problems for bridge construction and maintenance. All of these factors make for high real costs in developing a modern network of highways. This will not prevent their development, but it may slow the process down.

Prospects for growth of the other carriers' facilities seem to be good. Soviet plans for expansion of river and sea transport capacity, for example, are surprisingly grandiose. Freezing periods of from three to nine months each year, routes which only indirectly connect major industrial areas, and shallow channels are all discounted in favor of low ton-mile operating costs. The network of airfields and air transport routes, already quite extensive, will probably be expanded on the basis of military considerations more rapidly than purely economic considerations would justify. Pipeline transportation, still in its infancy, will no doubt grow as rapidly as steel supplies and output of petroleum and gas will permit.

All in all, the Soviet leaders seem to have learned that transportation is an integral part of economic activity, even though they attempt to hold it down to a minimum. The goal of reducing long-haul inter-regional traffic to a trickle would involve such high real costs in the use of low-grade resources that it is never likely to be pursued to its end. Thus we may anticipate an expansion of Soviet transport capacity in the coming years, at a rate which will just suffice to meet the requirements of the sprawling Soviet economy.

Transportation in Wartime

Returning now to the opening questions of this survey, what can be said about Soviet transportation under wartime conditions? Did the Soviet leaders learn from World War II how to overcome their transport weakness? Here several observations can be made, with somewhat conflicting results.

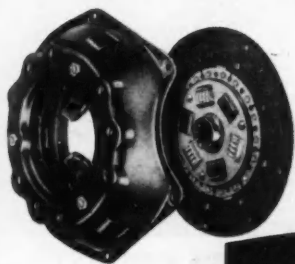
In World War II, the Nazi invasion took away almost half the Soviet railroad system, yet left about 80 per cent of the motive power and rolling stock in Russian hands. Consequently the unoccupied portion of the network

(Turn to page 100, please)

You can depend on -

BORG & BECK®

CLUTCHES... for that vital spot where power takes hold of the load!



Engineered by
BORG & BECK means...

CLUTCHES EXPERTLY DESIGNED
AND PRECISION BUILT
BY CLUTCH-MAKING
SPECIALISTS!

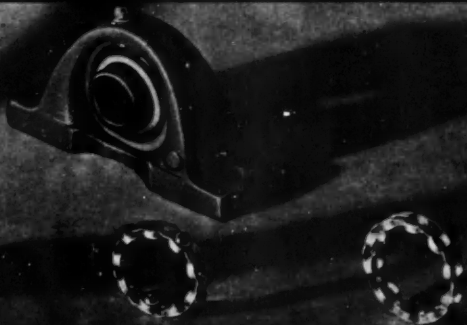
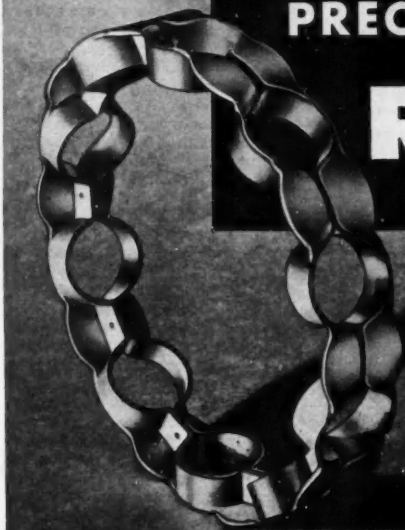


Reg. U.S. Pat. Off.



BORG & BECK DIVISION
BORG-WARNER CORPORATION
CHICAGO 38, ILLINOIS

FOR PRECISION IN BRASS— REVERE



BALL bearings are necessarily made to close tolerances which apply not only to the balls and races but also to the retainers which must have exact dimensions and shapes. This matter of retainer quality has been given careful study by the Stephens-Adamson Mfg. Co., Aurora, Illinois, maker of the well-known SealMaster Industrial ball bearing units. The company collaborated closely with the Revere Technical Advisory Service in working out the specifications and forming procedures for its brass retaining rings. As a part of this joint activity, Revere made a full survey of Stephens-Adamson requirements, with the object of standardizing and simplifying specifications for the benefit of both the engineering and the purchasing departments. The success of this work is indicated by this statement from the Superintendent of SealMaster bearing production: "First and foremost, I am pleased with the uniformity of gauge and temper of the Revere brass we have been receiving. This uniformity makes it possible to produce ball retainers of very close tolerance, with a minimum of rejections and at comparatively low unit cost. Furthermore, I have appreciated the dependable delivery service and the cooperation of the Revere organization."

In these times of scarcities, when it is more than ever necessary to reduce waste and save metal, you may wish to take advantage of Revere's skill and know-how in non-ferrous metals. Just get in touch with the nearest Revere Sales Office.

ABOVE, the largest retainer made for a SealMaster industrial ball bearing unit, contrasted with the smallest block and retainer.

BELOW, three of the steps in retainer production: blanked, formed and punched, and assembled part ready to receive the balls.

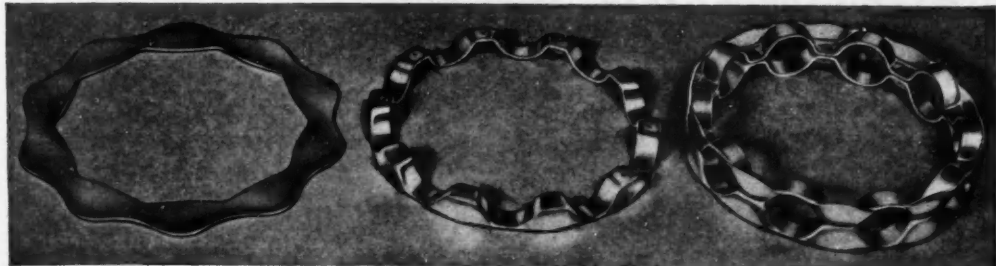
REVERE 150
COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801
230 Park Avenue, New York 17, N. Y.

Mills: Baltimore, Md.; Chicago and Clinton, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N. Y.

Sales Offices in Principal Cities, Distributors Everywhere.

SEE "MEET THE PRESS" ON NBC TELEVISION EVERY SUNDAY



DIESEL LOCOMOTIVES • HEAVY DUTY TRUCKS • CRAWLER TRACTORS • BUSES • ENGINES
 COMBINES • MACHINE TOOLS • CEMENT MIXERS • ROAD GRADERS • OUTBOARD MOTORS
 INDUSTRIAL PUMPS AND LIFT TRUCKS • MOTORCYCLES • WOODWORKING MACHINERY
 MARINE ENGINES • TRACTORS AND AVIATION EQUIPMENT
 AGRICULTURAL MACHINERY • CRANES • OIL FIELD MACHINERY
 RAILWAY MACHINERY • STREET SWEEPERS
 DIESEL LOCOMOTIVES • TRACTORS • ENGINES
 COMBINES • GRADERS • MOTORS
 INDUSTRIAL PUMPS • WOODWORKING MACHINERY
 MARINE ENGINES • TRACTORS AND AVIATION EQUIPMENT
 AGRICULTURAL MACHINERY • CRANES • OIL FIELD MACHINERY
 RAILWAY AIR-CONDITIONING EQUIPMENT
 OUTBOARD MOTORS
 BUSES
 FIELD
 AND
 OIL
 AVIATION

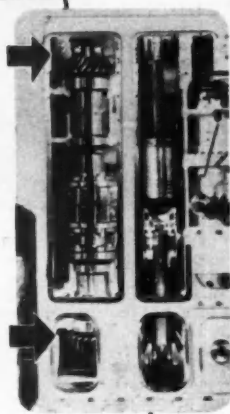
**For America's
Finest!**

Gears by FAIRFIELD

TWO sets of spiral bevel gears produced by Fairfield interconnect the dual crankshafts of the opposed piston diesel engines in the locomotive shown above, which is one of an ever-increasing fleet serving America's railroads. Diesel locomotives are just one of the many types of equipment that have benefited from Fairfield's pioneering work in producing high precision, automotive type gears to meet virtually any required specification of industry. If gears are a part of the product you make, get acquainted with Fairfield. Write today.

Fine Gears Made to Order

**SPIRAL BEVEL • STRAIGHT BEVEL
 HYPOID • HERRINGBONE
 HELICAL • DIFFERENTIALS • SPUR
 WORMS AND WORM GEARS**



The gear sets used in interconnecting the crankshafts of opposed piston diesel engine are indicated by arrows above.



Ask for a copy of bulletin describing Fairfield facilities.

FAIRFIELD MANUFACTURING CO.
 319 SO. EARL AVENUE LAFAYETTE, INDIANA

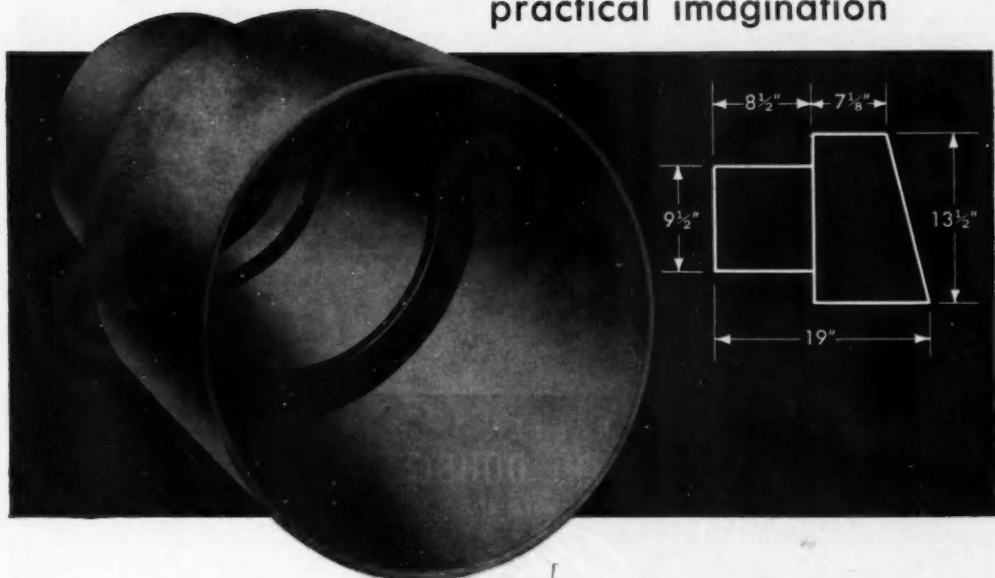
could operate in some ways more effectively than before. In any military operation which left the ratio of rolling stock and motive power to line facilities uniform throughout the USSR, this circumstance would not arise again.

Soviet rail connections with her frontiers during World War II were very thin by European standards, that is, there was no dense web of lines available for shifting forces along a front. The rebuilding since 1945 has emphasized trunk lines radiating out of Moscow, and some spurs in the devastated areas may not have been rebuilt, so that in this respect the current situation is probably no better than in 1940. However, it is a layman's impression that military transport, especially near a front, has shifted very largely from rails to roads. On this score, the USSR position is almost certainly improved over 1940. The roads themselves are probably not much better, but the number of vehicles which could be put into service is in all likelihood a good deal larger. The ton-miles of freight traffic carried by trucks in the USSR could not reach more than twice the 1940 level unless the trucking fleet also were larger. Incidentally, the five dam and canal building projects now absorbing so much Soviet energy are making use of up-to-date earthmoving equipment and trucks which could be transferred to military uses in the event of war.

The essential weakness of the Soviet transportation system lies in its thinness. By comparison with Germany or the United States, for example, there are relatively few alternative routes, among different carriers, between important points in the USSR. This is so obvious that it leads easily to the concept of hamstringing the Soviet Union by cutting a few crucial tendons. However, there is false security in this notion. Attentive readers of newspaper dispatches from Korea will have noticed that rail lines, rolling stock, and other transport facilities are still being bombed, more than a year after the beginning of the war. This would not be necessary if the rail lines had been thoroughly cut. Evidently it does not take long to get transport back into operation. Consequently any simplified notions of bringing Soviet activity to a halt by cutting off one part of the country from another are probably wishful thinking.

This is not to say, of course, that transportation has become one of the strong points in Russia's military potential. A thin network at home means inflexibility, lack of maneuverability, and more difficulty in adjusting to damage than if a wide assortment of alternative routes were available. The gage-change problem in the west is clearly a handicap for Russia. In the Far East, for any conflict near sea-board, Western nations using sea transport will have a transportation advantage over the USSR or China,

practical imagination



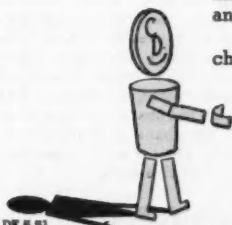
"welded" assembly makes large plastic parts practical and economical

Look at this large, laminated plastic part. It is 19" long with two concentric diameters of 13 1/2" and 9 1/2" connected by a flat ring. Think of the cost of molds for making such a piece—and then consider the fact that only a few such parts are required. The cost would be prohibitive.

It is on problems like this that Continental-Diamond's knowledge of plastics and their fabrication pays off for you. C-D engineers took two Dilecto tubes of the required diameters and wall thicknesses and then cut a ring from a sheet of Dilecto to just fit the O.D. of the smaller tube and the I.D. of the larger.

These three parts were then literally "welded" together into a strong, low cost part. The material used to do the "welding" is one of the compounds developed by C-D in their vast experience of fabricating parts of Fibre, Vulcoid, Celoron, Micabond, Dilecto and combinations of all of them.

If you have a problem—or a standard application for plastics, it will pay you to check with your nearest C-D office.



your partner in producing better products

DILECTO (Laminated Thermosetting Plastic)
CELORON (Molded High-Strength Plastic)
DIAMOND FIBRE (Vulcanized Fibre)
VULCOID (Resin Impregnated Fibre)
MICABOND (Bonded Mica Splittings)

DE-5-51

BRANCH OFFICES: NEW YORK 17 • CLEVELAND 14 • CHICAGO 11 • SPARTANBURG, S.C. • SALES OFFICES IN PRINCIPAL CITIES
WEST COAST REPRESENTATIVE: MARWOOD LTD., SAN FRANCISCO 3 • IN CANADA: DIAMOND STATE FIBRE CO. OF CANADA, LTD., TORONTO 8

Continental - Diamond FIBRE COMPANY

Established 1895...Manufacturers of Laminated Plastics since 1911—NEWARK 2 • DELAWARE

using a small number of rail lines and highways stretching for long distances through undeveloped territory.

Nevertheless, the question in the title of this article must be answered, "No." A single arrow in the heel of the Greek warrior spelled his doom. No similar attack on the transportation system of the USSR will have such results.

AUTOMOTIVE INDUSTRIES Keeps You Informed

The Business Pulse

(Continued from page 48)

offset by the rise in Government purchases of goods and services. Federal buying has expanded steadily since the rearmament program was undertaken in the third quarter of last year. Overall deliveries of military equipment are reported to have tripled during the first year of the program, and if the schedule is maintained they will triple again during the next twelve months to an annual rate of \$52 billion.

The Administration's opinion seems to be that the central problem in coming months will involve not voluntary but forced declines in personal buying and resultant inflationary pressures on price structures as military output cuts more deeply into civilian supply than it has done yet. Another problem is military output itself, which is dependent in part upon the maintenance of industrial peace. The strike of non-ferrous metal miners that broke out in the latter part of August reportedly cut the output of copper by as much as 95 per cent and severely reduced the production of lead and zinc as well. All these metals are indispensable to rearmament, and industrial shortages had been reported before the strike began.

Wage Increases

Industrial stoppages due to wage demands may or may not become less frequent as a result of the Wage Stabilization Board's decision to extend indefinitely its rule permitting wage increases based on advances in the cost of living. The decision apparently means that, under official policy, consumer purchasing power, in so far as it is determined by wage rates, is to be maintained, regardless of whether consumer supply is maintained or not.

The new wage policy was one of the first announced after the President "reluctantly" signed the extended and amended Defense Production Act, declaring that "we will not be able to hold down prices under this act." The wage policy decision suggests that the inflationary impetus of escalator contracts will not be measurably retarded.

The principal immediate effect of the new law in the field of indirect controls was to require the Federal Reserve Bank to relax the regulations governing consumer credit. Bank loan categories including consumer credit promptly reversed their downward trend of recent weeks, but whether this was caused by the change of regulation is doubtful, since bank loans not directly affected by the act also turned upward about the same time.

General Price Trend

Administration officials have predicted that, unless control powers are strengthened, prices, especially of foods, will rise, with the implication that, if controls are tightened, price stabilization will result. By the end of August, however, such forecasts showed no signs of being borne out by the general price trend, which continued the down-

(Turn to page 104, please)

CUT COSTS... FASTEN

"ON THE DOUBLE"

with the

Chicago

"214" DOUBLE

RIVET SETTER



The "214" automatically feeds, inserts and clinches two rivets at a time...with speed that may mean a big saving in your fastening costs.

14" throat makes large assemblies easy to handle. For tubular rivets as large as 1/4", or less in length. Quick Change Rotary Type Hoppers and Raceways permit a 5-minute changeover to rivets of different size. Adjustable anvils and riveting centers add to its versatility.

Ask us how the "214" can help you cut costs. Send a sample of your problem assembly (or blueprint) for a Free fastening analysis.

FREE CATALOG

contains valuable engineering information and rivet specifications plus illustrated descriptions of 26 Chicago Automatic Rivet Setters.

Chicago Rivet & MACHINE CO.
9612 West Jackson Boulevard, Bellwood (Chicago Suburb) Illinois
Branch Factory: Tyrone, Pa.

clothes dryers to deep fryers



wire cloth FOR HOME APPLIANCES

Whether the wire cloth is to be "standard" or "strictly to specification" ... or a tough "start from scratch" new development problem—Reynolds engineers are right at home in the home appliance field. And in other fields—automobiles to aircraft ... farm harvesters to fly swatters ... floor furnaces to faucet filters. And for the same reasons—Reynolds' fifty years of fabricating wire, and many, many more years of research measured in engineering man-hours. If you use wire cloth, Reynolds engineers can be helpful. Consult them without cost or obligation.

REYNOLDS WIRE DIVISION
NATIONAL-STANDARD COMPANY

DIXON, ILLINOIS

Clothes Dryers
Automatic Washers
Dishwashers
Refrigerators
Home Freezers
Vacuum Cleaners
Electric Ventilators
Dehumidifiers
Fruit Juicers
Electric Deep Fryers

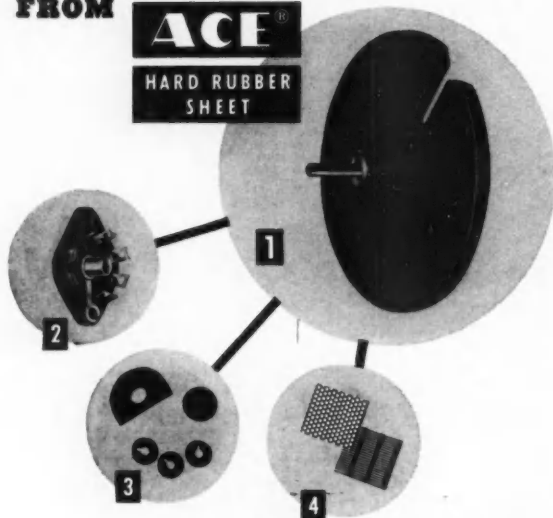


where HARD RUBBER is right...
use it!

HOW TO SPEED PRODUCTION

WITH PARTS PUNCHED
FROM

ACE[®]
HARD RUBBER
SHEET



- IDEA 1** Cut from strong, wear-resistant ACE hard rubber sheet, this precision-machined meter piston spends years under water without warping or swelling.
- IDEA 2** Intricate tube socket assembled at low cost from tiny punchings of Ace X-2-B. Strong, rigid. Dielectric strength 415 v/mil (60 cycles); Power factor 0.6% (1 megacycle).
- IDEA 3** Chemical resistant, strong (up to 10,000 psi. tensile), high-dielectric, wear-resistant ACE hard rubber sheet is ideal for myriads of small parts.
- IDEA 4** Can you use perforated or slotted hard rubber sheet as screens, strainers, separators, containers, etc.?

ACE hard rubber sheet punches and machines easily... cuts time and costs both! It's available in many grades and finishes, sizes to 24" x 50", as thin as 0.005". Ask for further details today.



American Hard Rubber Company

93 NORTH STREET • NEW YORK 13, N. Y.

The Business Pulse

(Continued from page 102)

ward movement begun last winter and appeared to be uninfluenced by the new law. The weekly wholesale price index of the Bureau of Labor Statistics now shows virtually no net rise since the beginning of 1951. The BLS consumers' price index, which usually lags behind movements in wholesale indices, rose to a new high on July 15—before the new law was passed.

Nor are predictions of higher food prices wholly supported by forecasts of the Department of Agriculture. Prices of farm products declined between mid-June and mid-July for the fifth consecutive month, and the movement between mid-July and mid-August seems to have continued downward. The prospect of large harvests has apparently been the main factor in the price recession. Prospective food supplies are believed to be great enough to offset or at least weaken the upward price pressures generated by stronger demand. Total food production this year is expected to be about 42 per cent larger than the average for 1935-39 and about one per cent above last year's output.

Federal Deficit

Many conservative groups agree that some further degree of inflation is in prospect but will not accept the proposition that direct controls provide the whole remedy. One significant source of inflation is the probable excess of consumer demand over supply—estimated by some at \$5 billion this year. Another is the danger of an inflationary deficit in the Federal budget, placed by the Treasury at \$9.9 billion for this fiscal year, based on present tax rates. Many reputable groups, the latest among them being the Joint Committee on the Economic Report, have suggested that proper methods of taxation would place Federal expenditures on a "pay as we go" basis, while simultaneously draining off the inflationary potential from those income groups whose spending, in the aggregate, contains the greatest danger.

At this writing the tax bill is still being considered by the Senate Finance Committee, which reportedly has substantially completed action on additional personal income and corporate levies which would yield an estimated \$1.6 billion less than the bill passed by the House. Unless the difference is made up by additional excise taxes—which is considered unlikely, however desirable from an economic viewpoint—the Federal deficit for this fiscal year, according to Treasury estimates, will be roughly \$4.4 billion.

Versatile **MACHINES** **USE** *Versatile*

VICKERS Hydraulics



Mixermobile Duo-Way Scoop with dozer at one end and one cubic yard bucket at other.

Vickers Hydraulics are versatile . . . they provide any motion or combination of motions, any amount of power at any distance. Control is fast, smooth, accurate and reliable. The heaviest mobile equipment can be put through the most precise operations with no more physical effort than it takes to flip a lever.

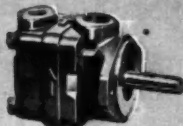
Hence, in designing versatile machines, manufacturers make large use of Vickers Hydraulics. These Mixermobile Units are representative . . . they are 100% Vickers equipped, offering the advantages of undivided responsibility and a nationwide organization. For information about the many ways that Vickers Hydraulic Pumps and Controls improve performance and cut costs on mobile type machinery, write for new Catalog M-5100 or get in touch with a Vickers application engineer.

VICKERS Incorporated • 142P Oakman Blvd. • Detroit 32, Mich.
DIVISION OF THE SPERRY CORPORATION

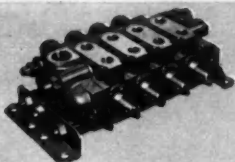
Application Engineering Offices: ATLANTA • CHICAGO (Metropolitan) • CINCINNATI • CLEVELAND
DETROIT • HOUSTON • LOS ANGELES (Metropolitan) • NEW YORK (Metropolitan) • PHILADELPHIA
PITTSBURGH • ROCHESTER • ROCKFORD • ST. LOUIS • SEATTLE • TULSA
WASHINGTON • WORCESTER

Engineers and Builders of Oil Hydraulic Equipment Since 1921

4498



Vickers Balanced Vane Pumps feature automatically controlled radial and axial clearances that maintain high efficiency throughout long life.



Vickers Multiple Unit Valves consist of individual operating valve sections, assembled in almost any combination for various hydraulic control functions. Provide precise positioning under actual operating conditions . . . unaffected by surges.

ASK FOR CATALOG M-5100
Vickers Hydraulics for Mobile Equipment



Vickers Steering Booster provides instantaneous, effortless hydraulic power for maximum maneuverability with heaviest loads on steering axle.

More
COST-CUTTING
Applications of
VICKERS
HYDRAULICS



Mixermobile complete mobile concrete mixing and elevating plant.

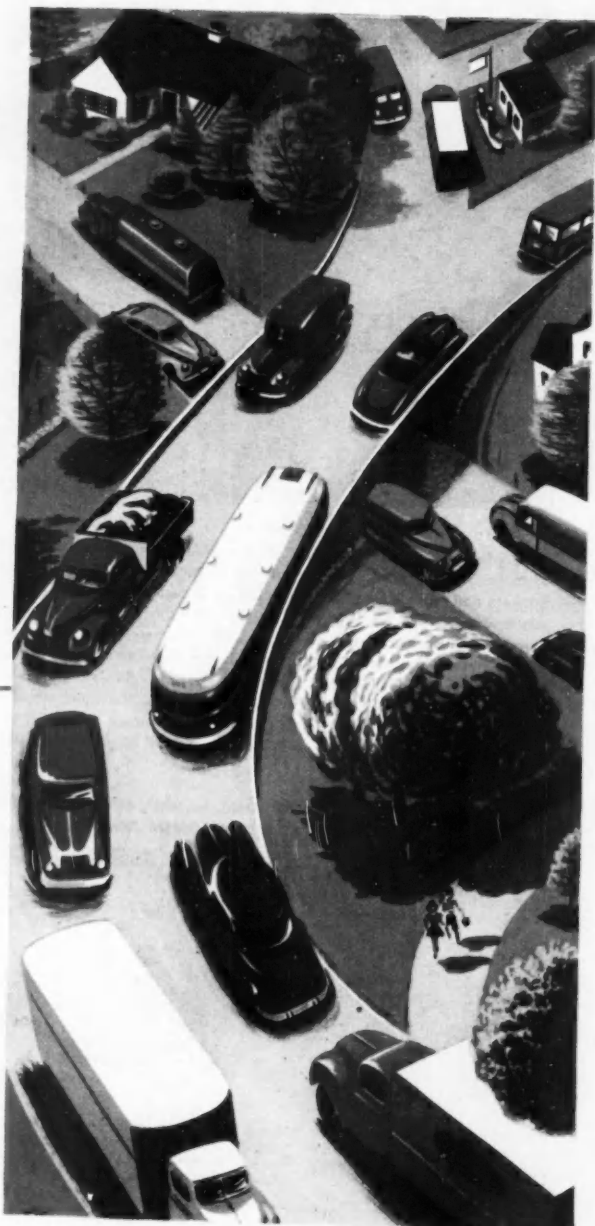


Wagnermobile Model "C" Scoop, one machine for six jobs.

STOP & GO

 is
our
business

RAYBESTOS-MANHATTAN, Inc.



EVERYONE who drives...and that means everyone from the average motorist to drivers of the biggest buses and trailer trucks...wants safe, sure stops and quick, smooth starts. What they want takes the finest brake lining, brake blocks, clutch facings, and engineered automatic transmission parts.

That's why vehicle manufacturers, as well as makers of many other kinds of equipment, rely on Raybestos-Manhattan, the world's leading supplier of friction materials. They know from experience that R/M STOP AND GO products meet every requirement...can always be counted on for greater safety and longer, more economical wear.

R/M friction materials are serving today in applications that vary from heavy-duty trucks to tiny precision parts for adding machines. This diversity provides a breadth of experience that can be most helpful to you.

Remember that when you call in your R/M representative, you enlist the full support of four great plants, four research departments, and four testing laboratories!

RAYBESTOS-MANHATTAN, INC.

EQUIPMENT SALES DIVISION

620 Fisher Bldg., Detroit 2, Mich.

Chicago 11, Ill. • Los Angeles 11, Calif. • Cleveland 14, Ohio

Factories: Bridgeport, Conn. Manheim, Pa. Passaic, N.J. No. Charleston, S.C.

Canadian Raybestos Co. Ltd., Peterboro, Ont.

RAYBESTOS-MANHATTAN, INC., Manufacturers of Brake Linings • Brake Blocks • Clutch Facings • Fan Belts • Radiator Hose • Mechanical Rubber Products • Rubber Covered Equipment • Packings • Asbestos Textiles • Powdered Metal Products • Abrasive and Diamond Wheels • Bowling Balls



NEW PRODUCTS

For additional information regarding any of these items, please use coupon on page 56

(Continued from page 64)

cation where lubricants can be used, one or more annular grooves are provided on the inside of the outer sleeve

to form storage wells for grease or other lubricants which are evenly distributed through the compensation gap.

Nylined bearings can be furnished in the plain sleeve type or the flange

**Do any filing job
easier,
better
and faster
with**

OVER-TANG File Holder

The newest method for all filing operations gives better control without handle interference. The Over-Tang positions the file to give accurate operator control, and the precision V-block grips the tang accurately and securely. You drive it on—knock it off. Vertical wooden handle is steel reinforced—you use it like a carpenter's plane. Ruggedly made for efficient, long, hard use. Weighs about six ounces.



Three sizes:

- No. 14H—for 14" heavy files
- No. 12M—for 12" heavy files
- No. 12L—for 12" and 14" Mill files



For full details and prices,
write or phone to

Remont
MANUFACTURING COMPANY
1301 Meyers Road, Lombard, Ill. • Tel: Lombard 2373

type. When substantial thrust loads must be carried in addition to radial loads, the bearing is usually laid out to provide a separate surface of nylon bearing material to take the thrust.

F-72—Two-way Radio

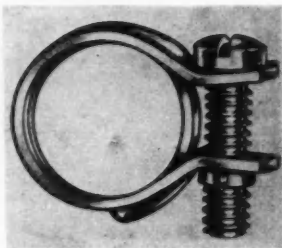
A low-power two-way radio that utilizes the Uni-Channel Sensicon receiver has been designed by Motorola, Chicago, Ill., for industrial radio installations.

The unit meets FCC regulations that allow a maximum power input of three-watts to the final amplifier for those industries where all two-way radio communications are carried on within a single plant area.

The low-power Uni-Channels can be installed, either as base stations or as mobile units. They can be mounted and used on fork-lift trucks or other intraplant vehicles to speed materials movement, eliminate deadheading time, and reduce the total number of vehicles needed.

These small, compact transmitter-receiver units are available either as a single package with built-in speaker and control head or with individual speaker and control head.

F-73—Two-Piece Hose Clamp



Put out on the market by Central Equipment Co., Chicago, Ill., is this two piece hose clamp for high pressure lines such as oil, air, and hot water. It is made of high carbon steel and is plated for rust prevention. The nut is integral with the body of the clamp.

F-74—Tumbling Compound

Tumb-L-Magic, a wet-process tumbling compound, is an addition to the line of tumbling equipment, compounds and techniques developed by Tumb-L-Matic, Inc., New York. Special properties of this formulation are attributed by the manufacturer to the greater abrasive action of the media because of the chemical cleaning action of Tumb-L-Magic. The cleaner acts to suspend grease and cutting in the solution, thus keeping work surfaces and abrasive media free of action-retarding accumulations.

(Turn to page 110, please)



FRAM stands for QUALITY

IN major plants across the nation, in modern laboratories and engineering facilities, the byword at Fram is *quality*. It's the kind of quality that comes from precise filtration engineering translated into vast production.

From these plants have come the Fram Firsts that advanced engineered protection for the products of the automotive industry. Fram quality has molded

the decision of over 70 leading manufacturers of cars, trucks, tractors, buses and engines to use filters embodying the Fram Principle of Oil Filtration on some or all of their vehicles.

Bring your filtration problems to Fram. FRAM CORPORATION, Providence 16, R. I. In Canada: J. C. Adams Co., Ltd., Toronto, Ontario.

Manufacturers of...

• FRAM OIL & MOTOR CLEANERS • FRAM FILCRON REPLACEMENT CARTRIDGES • FRAM CEL-PAK REPLACEMENT CARTRIDGES • FRAM FILTRONIC REPLACEMENT CARTRIDGES • FRAM CARBURETOR AIR FILTERS • FRAM GASOLINE FILTERS • FRAM CRANKCASE AIR FILTERS • FRAM POSITIVE CRANKCASE VENTILATORS • FRAM RADIATOR & WATER CLEANERS • FRAM FUEL OIL FILTERS • FRAM INDUSTRIAL OIL AND FUEL FILTERS • FRAM COMBINED SEPARATOR-FILTER FOR IMMISCIBLE LIQUIDS • FRAM CUSTOM-DESIGNED FILTERS FOR SPECIALIZED APPLICATIONS.



CHEMICALS
ACP
PROCESSES

Alodine®

PROTECTS ALUMINUM ANCHORS THE PAINT FINISH

MEETS GOVERNMENT SPECIFICATIONS

MIL-C-5541 U.S. Navord O.S. 675
MIL-S-5002 16E4 (Ships)
AN-F-20 U.S.A. 72-53 (See AN-F-20)
AN-C-170 (See MIL-C-5541)

EFFECTIVE, ECONOMICAL EFFICIENT

ALODIZING is an electroless protective surface conversion process for bonding paint to aluminum and protecting the metal.

Tough, durable **ALODIZED** surfaces are obtained easily and rapidly by immersion, brushing, or spraying in a multi-stage power washer.

ALODINE amorphous phosphate coatings provide extra paint permanence and extra durability for aluminum parts and products.

BRUSH "ALODINE" PROTECTS ALUMINUM IN THE FIELD, SHOP, OR HANGAR

Brush **ALODINE** is easily applied in a simple brush-on or flow coat process to large assemblies and surfaces—airplanes, trucks, trailers, boats, housing, building siding, railway cars, bridges, etc.—that are too bulky or too remote to be conveniently treated in tanks or a multi-stage power spray washer. The cleaning and coating chemicals for Brush **ALODIZING** are shipped in bulk or in the convenient Brush **ALODINE** Chemical Kit No. 1. This Kit contains enough chemicals to treat about 1,000 square feet of surface and is an ideal package for use at airfields of commercial airlines or of the Armed Services anywhere.

Pioneering Research and Development Since 1914

AMERICAN CHEMICAL PAINT COMPANY
AMBLER, PA.

Manufacturers of Metallurgical, Agricultural and Pharmaceutical Chemicals

NEW PRODUCTS

For additional information please
use coupon on page 56

(Continued from page 108)

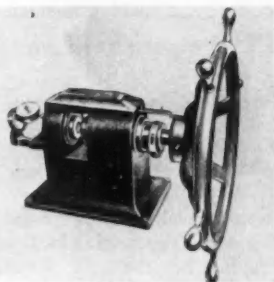
F-75—Neoprene Radiator Hose

Thermoid Co., Trenton, N. J., has introduced a Neoprene bus and truck radiator hose which the company's engineers claim offers four times greater resistance than ordinary hose to oil, grease and gas fumes.

Specifications include: An inner tube of 3/32 in. average thickness compounded from Neoprene. Reinforcement consists of woven fabric frictioned on both sides with a Neoprene compound and plied on a 45 deg bias. This feature provides needed flexibility to withstand misalignment and vibration. The outer cover of the hose is 1/32 in. Neoprene.

It is available in all standard sizes up to and including 1 1/4 in. ID, two-ply construction, wall thickness 3/16 in.

F-76—Sheet Metal Tester



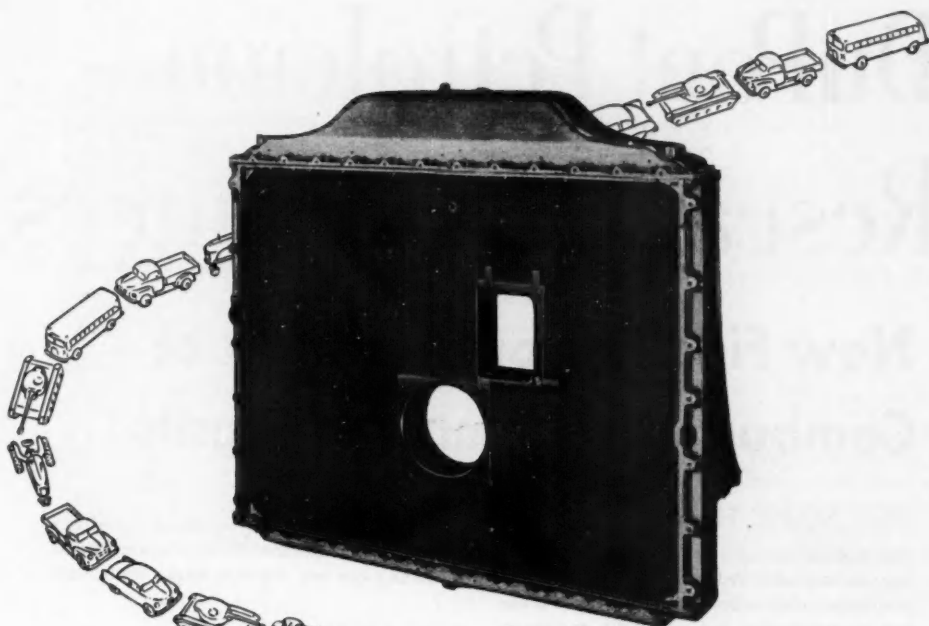
Alexander sheet metal tester.

J. Arthur Deakin & Son, Jamaica, N. Y., national representatives for George H. Alexander Machinery, Ltd., are introducing Alexander's sheet metal Tester for making the Erichsen test.

This tester will handle material up to 5/64 in. thick. Readings can be obtained to 0.0004 in.

Test pieces of 3 1/2 in. square and sheets or strips up to 2 7/16 in. wide can be tested with standard tools. Additional interchangeable tools can be supplied for checking narrow strips to determine the deep drawing value of materials.

Another feature is the direct reading pressure gage that registers the pressure exerted on the fracture point of the material.



Where radiator dependability is vital

Trucks, buses, farm equipment and military vehicles generally have low road speed in comparison with their engine temperatures. Balanced cooling, through proper radiator design, is essential to good engine performance.

Keeping them cool has been a Long specialty since 1903. Our engineers give prompt and careful attention to special radiator requirements.

LONG MANUFACTURING DIVISION • Borg-Warner Corporation
DETROIT 12, MICH. and WINDSOR, ONT.



LONG

CLUTCHES • RADIATORS • TORQUE CONVERTERS
OIL COOLERS

DuPont Petroleum Research Announces

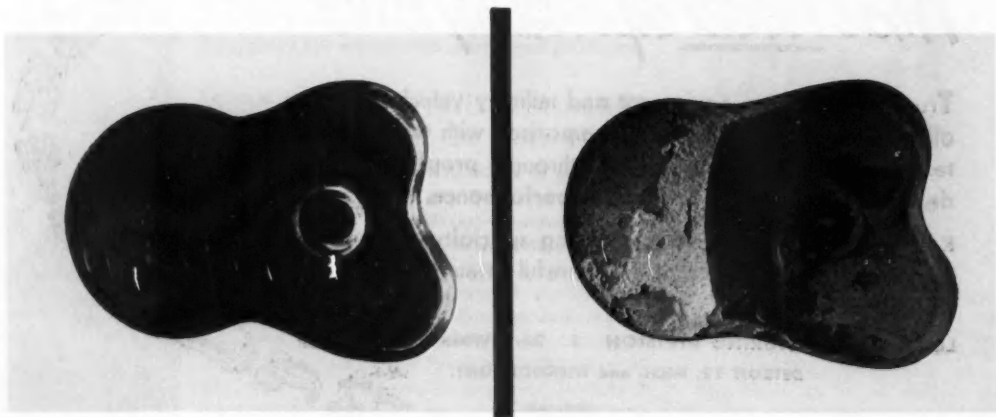
New Findings on the Effect of Combustion Chamber Deposits

FOR SOME TIME the question of engine knock—particularly the increase in knocking tendency observed during the first few thousand miles of operation—has presented a problem to automotive and petroleum engineers.

In conjunction with our work in helping refiners provide knock-free fuel performance by blending tetraethyl lead compounds with gasoline, the Du Pont Petroleum Laboratory recently made an extensive study of the problem. Since the increase in knocking tendency was

generally attributed to formation of deposits in the combustion chamber, Du Pont was interested in finding out *how* deposits might contribute.

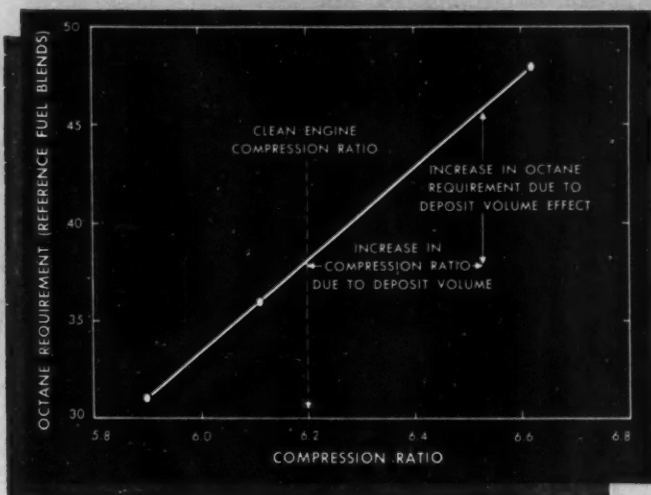
THE VOLUME EFFECT of combustion chamber deposits was suggested as a possible factor. The volume of the deposit itself actually increases the compression ratio by decreasing the combustion chamber volume. Raising the compression ratio naturally boosts the



The picture at the left shows a cylinder head completely free of deposit. After it was used in an engine for 80 hours of operation, it accumulated the deposit shown at the right. The liquid displacement volume of this deposit was used in determining the deposit volume effect on octane increase.

DUPONT SUPPLIES A COMPLETE LINE OF GASOLINE ADDITIVES

Tetraethyl Lead Compounds (Motor Mix—Aviation Mix) • Antioxidants • Metal Deactivator • Dyes



This chart shows clearly the final step in evaluating the contribution of deposit volume to octane requirement increase. It is based on tests in an ASTM Supercharge Method engine.

octane requirement of the engine by increasing the temperature and pressure of combustion chamber gases.

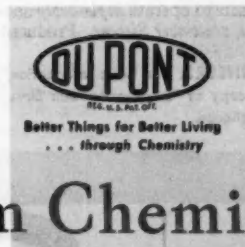
This compression ratio increase is proportional to the amount by which the deposit reduces clearance volume. By measuring the physical volume occupied by deposits, it was possible to calculate the resulting change in compression ratio. This change was translated into terms of octane requirement by comparison with previously established relationships.

As a result of these Du Pont studies, it was found that only 20 to 40 per cent of the total increase in knocking tendency could be accounted for by the volume change.

OTHER FACTORS — In addition to studying the volume effect, Du Pont also investigated the catalytic and thermal insulating effects of deposits on octane requirements. Results of these studies, plus more complete information

on the volume factor, are now available to you in a new paper published by Du Pont.

This work on engine deposits is part of the continuing research carried on at the Du Pont Petroleum Laboratory. As a supplier of tetraethyl lead and other additives for improving fuel performance, Du Pont is interested in helping refiners make the best possible use of these additives in solving their own manufacturing problems. It is also the aim of Du Pont Petroleum Research to help refiners produce better and more efficient fuels to meet the needs of future engines.



Petroleum Chemicals

E. I. DU PONT DE NEMOURS & COMPANY (INC.)
Petroleum Chemicals Division • Wilmington 98, Delaware

District Offices: { New York, N. Y.
Chicago, Ill.
Tulsa, Okla.
Houston, Texas
Los Angeles, Calif.

District Laboratories: { Wilmington, Del.
Chicago, Ill.
Tulsa, Okla.
Houston, Texas
El Monte, Calif.

IN CANADA: Canadian Industries Limited — Toronto, Ont. — Montreal, Que.

C/R

RUSHING TOMORROW

Rushing tomorrow is habitual with American engineers. Those "insurmountable" problems of a few years ago are now everyday, commonplace items. Just like Sirvene parts.

Sirvene has played a continuous, vital role in rushing tomorrow. It, too, is a product of the "impossible". You see, Sirvene is the name which identifies the solution of a manifold variety of problems in the design and development of diaphragms, boots, gaskets, and similar parts for use under extremely critical operating conditions.

If, in your task of "rushing tomorrow", you are developing an urgently needed mechanism in which you require pliable parts to operate *dependably* under severest circumstances, *remember Sirvene*. Produced only by

Chicago Rawhide engineers, Sirvene will fulfill your requirements to the letter.

Compounded from pure, oil-resistant elastomers, accurately designed and developed to your specifications, and manufactured in mass quantities under strict laboratory control, Sirvene parts give long service under extremes of heat and cold, in air, oil, water or other solvents, and under high pressures, wear or abrasion. Sirvene can be compounded to possess almost any combination of physical properties and characteristics you require.

Next time you have a pliable parts problem that's tough to lick... chances are, Sirvene can provide the right answer.

ENGINEERS: For basic information, write for your copy of "Engineering with Sirvene". There is no charge.

CHICAGO RAWHIDE MANUFACTURING CO.
1310 Elston Avenue, SIRVENE DIVISION, Chicago 22, Illinois



SIRVIS

Mechanical Leather Products
Boots, diaphragms, packings and other products give dependable service under difficult operating conditions.



PERFECT Oil Seals

C/R seals are used in more motor vehicles, farm implements and industrial machines than any other shaft-type sealing device.

C/R
SIRVENE

THE SCIENTIFIC COMPOUNDED ELASTOMER

Boston • New York • Syracuse • Philadelphia • Pittsburgh
Cincinnati • Cleveland • Detroit • Peoria • Minneapolis
Kansas City • Houston • Los Angeles • San Francisco

NEW

PRODUCTS for AIRCRAFT

FOR ADDITIONAL INFORMATION regarding any of these items, please use coupon on PAGE 56

S-15—Wire Harness Clamp

For bundles of wire in aircraft a wire harness clamp has been put out by Tinnerman Products, Inc., Cleveland, Ohio.

This clamp is built with an interlocking slot and tongue. The T-shaped tongue, which can be inserted by hand pressure, slips into a narrow portion of the slot and is held by lateral and outward spring action.

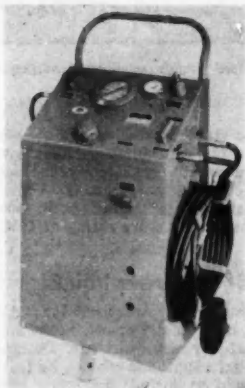
Made to be used singly or in tandem and to hold bundles 5/16 in. to 1 1/4 in. diam, this clamp is said to meet maximum loading requirements for size as set forth by the electrical groups in military aircraft.

The clamp has the following additional features:

1. It can be opened without removal from the structure to which it is attached.
2. It can be pre-assembled to the wire bundle for installation of the completed harness to the aircraft.
3. It is suitable for wire bundles of varying diameters.

S-16—Portable Hydraulic Testing Unit

For operational and proof testing of aircraft hydraulic components and systems at high pressures—500 to 5000



Sprague portable hydraulic tester, Model S-404.

psi—and at low flows—approximately one gpm at 2000 psi, Sprague Engineering & Sales, Gardena, Calif., has

brought out its Model S-404 portable hydraulic power unit.

Power is furnished by a Sprague

**SPECIAL APPLICATION
FRACTIONAL HORSEPOWER
MOTORS**

Proved
DEPENDABILITY

Successful operation in many thousand motor-driven products and devices—over a period of 36 years—has proved the thorough reliability of Lamb Electric Motors.

The good service for which Lamb Electric Motors are known, results largely from the fact that they are designed to provide the exact electrical and mechanical requirements for each product they drive.

This special engineering assures top product performance and usually results in savings in space, weight and cost factor. The Lamb Electric Company, Kent, Ohio.

Motor having substantial power output for computing machines and other types of motor-driven office equipment.



Planetary inbuilt speed reducer permits a straight-line drive, symmetrical construction, insures good performance.

THEY'RE GOING INTO AMERICA'S *Finest* PRODUCTS

Lamb Electric
SPECIAL APPLICATION
FRACTIONAL HORSEPOWER **MOTORS**

Whether You're Tooling for:



or



Every Engineering Dept. and Model Shop Needs

PULLMAX

THE MOST COMPLETE LINE OF SHEET STEEL
AND PLATE WORKING MACHINES

For Working Sheet or Plate Metal in Making
Sample Parts and Small Production Runs
Without the Expense of Costly Dies

Company after company is discovering the complete versatility of the amazing Pullmax machines. Made in many sizes to fit your requirements.

A reciprocating movable upper tool and stationary lower tool provides a smooth perpendicular cut that requires no further finishing. Upper tool can be raised to insert or remove work for cutting in center. Cutting capacities listed are for cutting mild steel.

PULLMAX DOES

- ★ STRAIGHT CUTTING
- ★ CIRCLE CUTTING
- ★ INSIDE CUTTING
- ★ IRREGULAR CUTTING
- ★ SLOT CUTTING
- ★ BEADING
- ★ FOLDING, OFFSETTING
- ★ NIBBLING



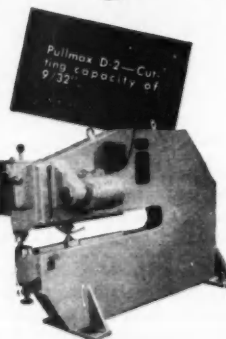
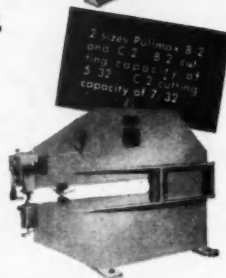
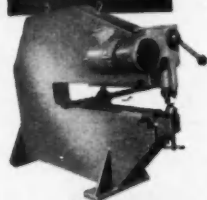
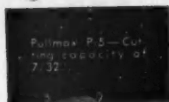
PULLMAX MACHINES WORK:
MILD STEEL WIRE MESH
STAINLESS STEEL PLASTIC
NON FERROUS METAL and other materials

WRITE FOR LITERATURE
AND PRICES TODAY



AMERICAN PULLMAX CO., INC.

2633 N. WESTERN AVE., CHICAGO 47, ILL.



New AIRCRAFT PRODUCTS

For additional information please
use coupon on page 56

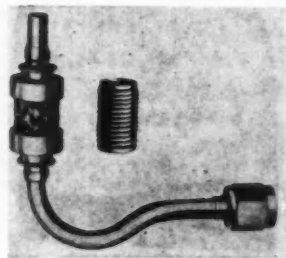
Model S-216-C air operated boost pump utilizing plant air supply. The unit is self-contained and equipped with pressure regulator, shut-off valve, relief valve, four-way selector valve and necessary instruments, controls and connecting hoses. It is available with either a single or dual outlet system.

Components are housed in an all-steel cabinet, mounted on 6 in. rubber tired wheels. It weighs 165 lbs, measures 14 in. by 20 in., and stands 44 in. high including handle.

While designed primarily for aircraft testing, the machine can be used to test all types of hydraulic components and systems operating within its capacity range.

S-17—Flexible Manifold Connection

To overcome the effects of high temperatures in jet engines, Clifford Mfg. Co., Waltham, Mass., has developed a stainless steel flexible fuel oil manifold connection employing bellows as the flexible element.

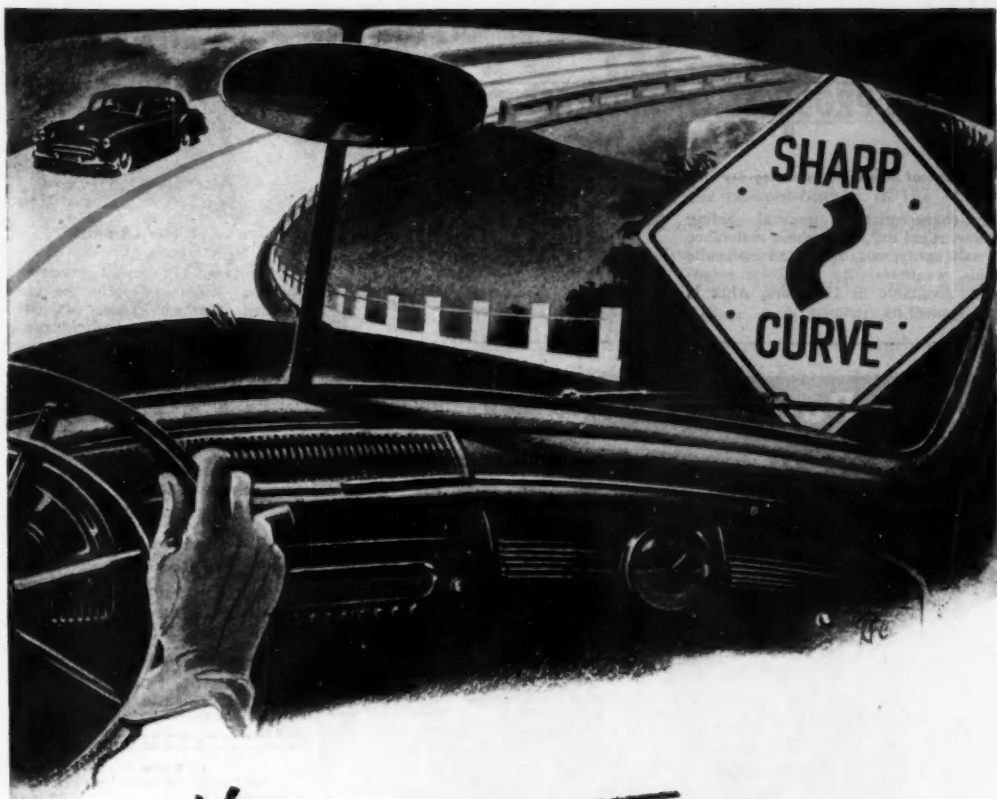


Clifford flexible manifold connection for jets.

The stainless steel bellows is welded to the fuel oil tubing and then covered with a metallic braid to give mechanical protection to the assembly. Units are furnished in 1/4 in. and 3/8 in. tubing, and have a pressure rating of 1000 psi.

S-18—Aircraft Paint

Chamberlain Aviation, Inc., Akron, Ohio, has recently placed on the market a finish for metal aircraft. Designated as Alux, a synthetic enamel, its features are said to include minimum surface pre-treatment, excellent adhesion to aluminum without priming, good work-



You can count on Thompson
FOR "ENGINEERED STEERING"

Thompson Products' Detroit Plant has been working closely with automotive engineers for 35 years... engineering safe steering into powerful, high-speed cars and trucks.

Today, Thompson makes more steering linkage for cars, trucks and tractors than anyone else in the world.

Thompson's research, experience and manu-

facturing facilities are *always* at the disposal of *all* automotive manufacturers.

With its modern plant, located in the heart of the automobile center, Thompson can and does supply top-quality steering parts.

Call on us to help solve your steering problems. Thompson Products, Inc., 7881 Conant Avenue, Detroit, Michigan. Phone: WA 1-5010.

Thompson  Products, Inc.
DETROIT DIVISION

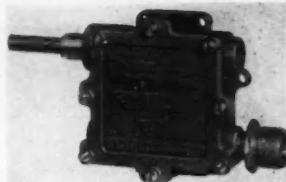
NEW PRODUCTS for AIRCRAFT

For additional information regarding any of these items, please use coupon on page 56

ing characteristics, unusual hiding power, rapid dry, high gloss, resistance to salt spray, oils, fuels and hydraulic fluids, weatherability and color retention. Available in 11 colors, Alux is best applied by spraying.

S-19—Snap Action Switches

Micro Switch, Freeport, Ill., a division of Minneapolis-Honeywell Regulator Co., has announced a series of



Micro Switch type LA switch

small-size type LA sealed precision snap-action switch assemblies for use in exposed locations. These switches are especially suited for switching of direct current circuits in aircraft where equipment is exposed to ice, water, oil, and dirt.

Enclosed within the diecast aluminum housings are two single-pole double-throw Micro type V3 switches whose nearly simultaneously actuation provide a variation of double-pole double-throw circuit control.

Characteristics of 1LAI

Operating Force 4 lb. approx.
Differential Travel 1/16 in. approx.
Weight 8 oz. approx.

Characteristics of 2LAI

Operating torque 16 oz. approx.
Differential Travel 5 deg. approx.
Weight 9 oz. approx.

Electrical Data

d-c Ratings

For Inductive and Heater Loads

30 volts d-c 10 amp. at sea level
30 volts d-c 6 amp. at 50,000 feet altitude

a-c Ratings

For Inductive and Heater Loads

125 or 250 volts a-c 10 amp.

Sealed enclosure is diecast aluminum alloy, anodized, impregnated and painted inside and out with a protective coating of zinc chromate primer. Synthetic rubber "O" rings seal the cover and shaft openings.

The catalog listing 1LAI is provided with a plunger type of actuator. Catalog listing 2LAI has a rotating type of actuating shaft adjustable to any of 36 positions in 360 deg.

S-20—Hydraulic Selector Valves

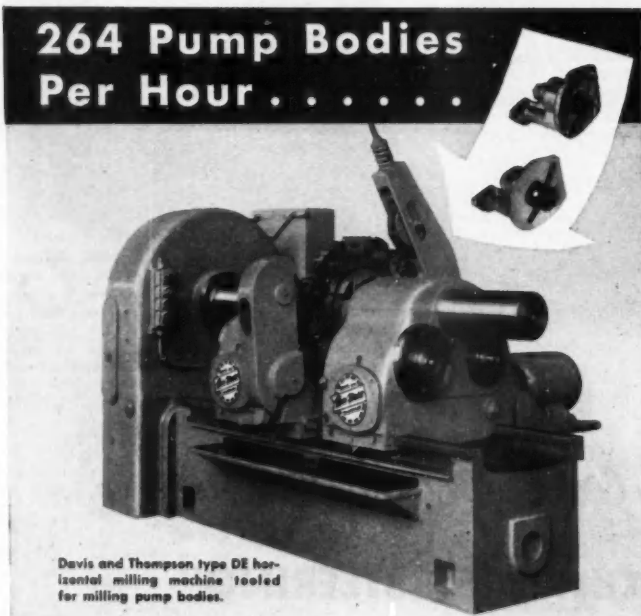
An improved 3000 psi balanced type four-way hydraulic selector valve, known as the AV-14, is now available from General Controls Co., Los Angeles, Calif.

The valve is electrically controlled and pilot operated.

Among the features of the electro-hydraulic selector valve are the specially hardened and optically-ground metal sealing surfaces. The four-way hydraulic selector valves, which were designed and tested in accordance with all applicable Army and Navy specifications, are suitable for operation with all presently accepted hydraulic fluids.

Standard models are offered with

264 Pump Bodies Per Hour



Davis and Thompson type DE horizontal milling machine tooled for milling pump bodies.

1-A Standard Horizontal Milling Machine

Oil pump bodies requiring high degree of finish and high production are rough and finish milled on both sides simultaneously with this Davis and Thompson type DE milling machine. Production is 264 pieces per hour.

Patented Angular Spindle Adjustment Allows "Toe Cutting"—Maintains Fine Finish at High Production

The finishing spindle is provided with an exclusive D&T design which allows angular adjustment. This in turn results in "toe-cutting" and

eliminates "drag" of the cutter over the finished surface. Both roughing and finishing spindles have micrometer endwise adjustment.

A Basically Standard Machine Employing Roto-Matic Principle For High Production Special Milling

Like all D&T machines this model DE is designed for long life and trouble-free operation. Each head has independent drive. There is backlash take up to mandrel. Anti-friction bearings throughout. Rapid traverse between cuts can be incorporated.

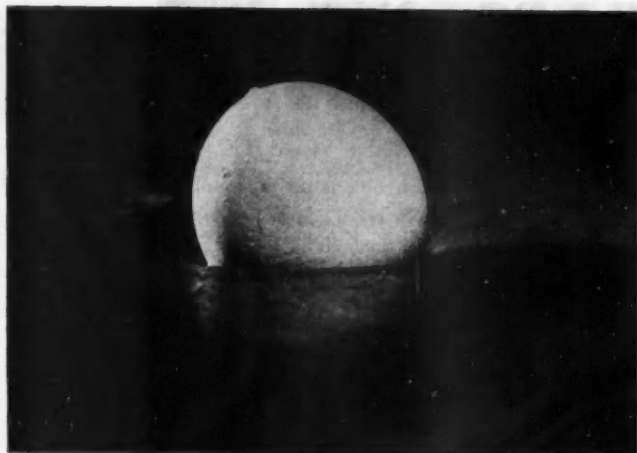
Free Data will be furnished upon request.



Davis & Thompson Company

6411 W. BURNHAM ST., MILWAUKEE 14, WISCONSIN

119



Unretouched photograph taken at the moment of impact by micro-flash process.

Eggs bounce off "SHOCK-ABSORBING" RUBATEX without breaking!

Dropped from a height of more than one hundred feet and traveling at over sixty miles an hour, this egg bounced off a three-inch-thick RUBATEX closed cellular rubber pad without breaking.

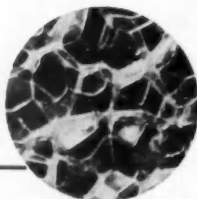
The ability of RUBATEX to literally smother impact is due to a dense structure of tiny balloon-like chambers, each retaining inert nitrogen under pressure. Each chamber is completely sealed from the others by a wall of live rubber, forming an amazingly resilient cushion which rapidly dissipates the hardest blows.

If you have a gasketing, sealing,

shock-absorbing, or vibration damping application—or perhaps a critical packing problem—you will find RUBATEX possesses characteristics ideal for your purpose. RUBATEX cannot absorb moisture. It has high insulating value—is resistant to oxidation and is rot and vermin proof. It has good compressive strength—is resilient, light in weight, and buoyant.

For further information, write for Catalog RBS-12-49, Great American Industries, Inc., RUBATEX DIVISION, BEDFORD, VIRGINIA.

Photo-micrograph of RUBATEX closed cellular rubber shows the tiny, individually sealed balloon-like chambers which retain inert nitrogen under pressure.



RUBATEX[®]

CLOSED CELL RUBBER
FOR GASKETING • CUSHIONING • SHOCK
ABSORBING • VIBRATION DAMPING

New AIRCRAFT PRODUCTS

For additional information please
use coupon on page 56

two choices of porting arrangements in the neutral, or de-energized position. In the trailing or fairing type, the cylinder ports are connected to the return line and the pressure port is closed. In the cylinder lock type, with the cylinder ports and pressure port closed, the integral thermal relief is optional.

These valves are available with or without manual over-ride, along with various choices of electrical connectors. Available, too, is the two-position, non-interflow type valve which also features an optional manual over-ride.

Ford Luxury Model

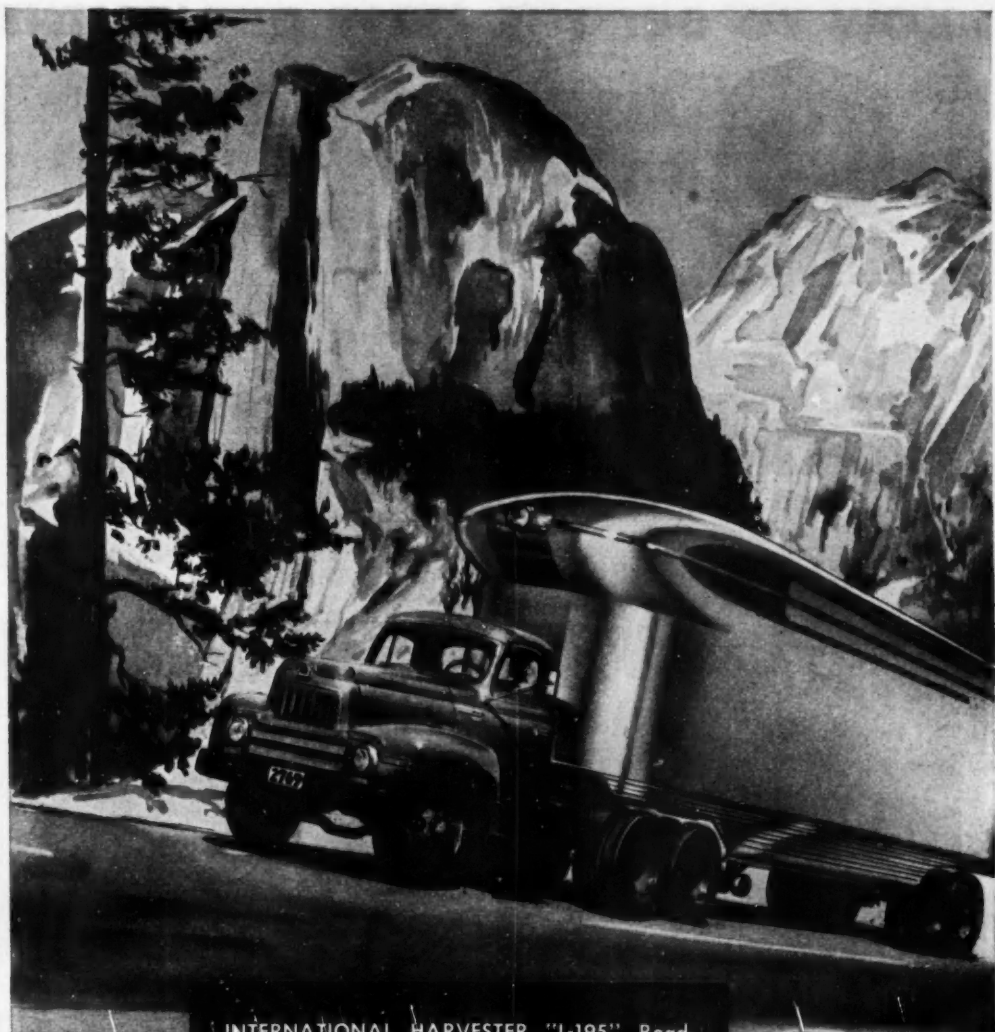
(Continued from page 37)

front fenders with fog lamps just below them. The curved, fixed windshield has a width of 48 in. and the rear window has practically the same shape and dimensions, but is in three sections. Rear-end treatment duplicates that at the front, with a wrapped bumper having red reflectors recessed in the guards. These reflectors are now compulsory under French law. Tail lights are set low on the fenders. All hinges are concealed, and the door handle is horizontal with a press-button release. The only trimming is a stainless steel strip slightly above the height of the wheel centers, and a similar strip around the windows.

A conventional transmission is standard equipment, with the Cotal electromagnetic unit offered as an option at extra cost.

According to François Lehideux, president and general director of the French Ford Co., deliveries will begin in October, starting at five per day and quickly increasing to 15, while the Vedette, with an all-metal body built by Chausson under Budd license, will continue at the present rate of 100 per day. The Facel-Metallon Co., with four factories in the Paris region, is equipped for the production of special bodies on a commercial scale. In addition to working for Ford, it builds combination light-alloy bodies for the Panhard-Dyna and sports bodies for Simca.

Ford broke away from tradition by uncovering the Comete at a preview in the fashionable holiday resort of Biarritz, on the Spanish border. The first public showing will be at the Paris automobile show in October.

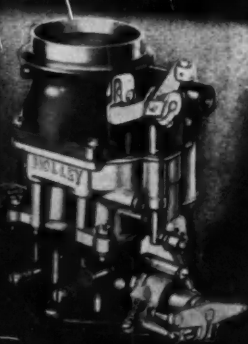


INTERNATIONAL HARVESTER "L-195" Roadliner tractors are standard equipped with the Holley AA-1G Carburetor and the Centri-Vac Governor combination. The carburetor governor combination gives positive power control based on engine speed.

HOLLEY
Carburetor Co.

For Half a Century —
Original Equipment
Manufacturers for the
Automotive Industry.

DETROIT 4



HOW TO GET THE MOST OUT OF THE



"lean alloys
do the job when
we use U-S-S Improved
Heat Treatment*"

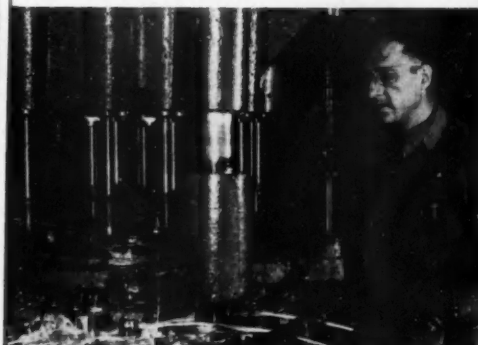
says C. E. WILDERMAN,

Vice President, Tool Division, Utica Drop Forge & Tool Corp., Utica, N. Y.

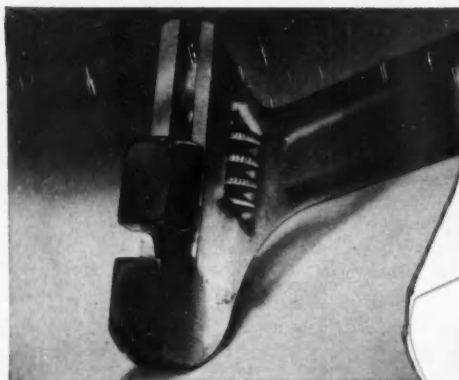
*available without charge



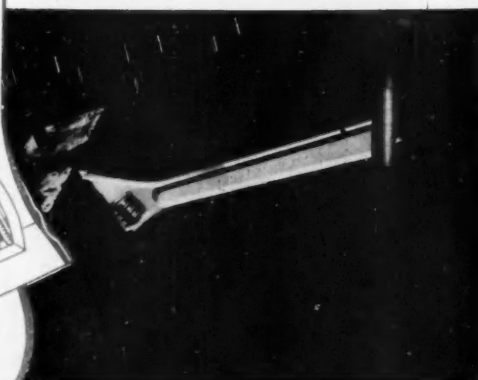
"... lean alloys forge easier than high alloys, so we get longer die life."



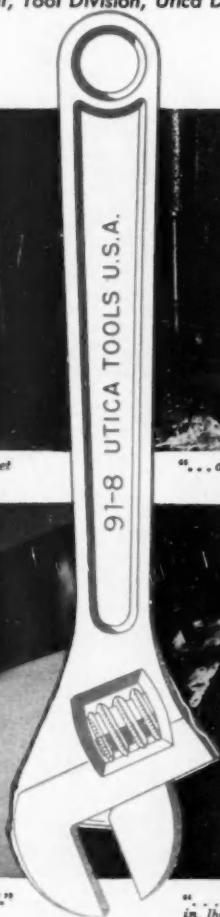
"... drilling and machining operations are simplified."



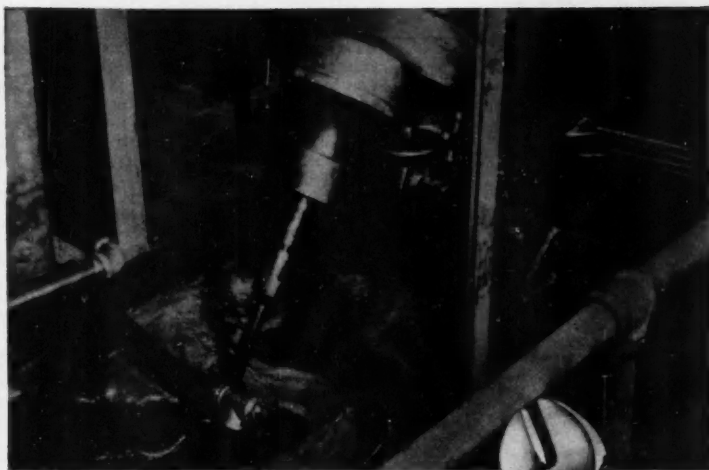
"... working faces are easily induction hardened." Notice dark sections on jaw faces.



"... torque tests average 25,000 in. lbs. against 7,650 in. lbs. required by Federal Specifications."



LEAN ALLOY STEEL YOU'RE GETTING



U-S-S Improved Heat Treatment is an improved method of quenching and tempering by means of violent agitation of the quenching bath. The basic engineering principles involve quench tank design, and the definite size, number, placement and powering of the propellers.

BY USING U-S-S IMPROVED HEAT TREATMENT, the Utica Drop Forge & Tool Corp. find they easily achieve the great strength demanded in their high quality adjustable-end wrenches with a medium carbon lean alloy grade of Carilloy steel. The use of a lean alloy in turn means several extra advantages. But let Mr. Wilderman tell the story:

"We have 3 big reasons for using a lean alloy steel for our wrenches. 1) It forges easier than the high alloys, so we get longer die life, 2) Lean alloys require shorter annealing cycles and 3) Our drilling and machining operations are simplified and we have lower perishable tool cost.

"Using U-S-S Improved Heat Treatment, our metallurgists have developed heat treating methods that enable us to get results with lean alloys that are equal to or even better than those obtainable with the high alloys.

"In our operation, the wrench is hardened and tempered to a uniform 44/46 Rockwell "C" scale with the aid of U-S-S Improved Heat Treatment. Then the working faces are easily induction-hardened to 55/57 Rockwell "C" scale. The induction-hardened areas are shown by the dark sections on the photograph.

"Daily control tests conducted on the hydraulic

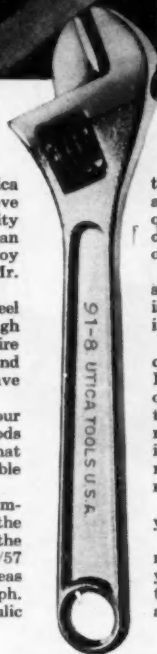
testing machine shows results (for the 12" wrench) averaging 25,000 in. lbs. against 7,650 in. lbs. required by Federal Specifications. We think a good deal of the credit for these torque ratings is due to our U-S-S Improved Heat Treatment."

If you are having heat treating difficulties, keep a sharp eye on quenching methods. Proper quenching is often just as important—sometimes even more important than the steel or the heating.

U-S-S Improved Heat Treatment is a superior quenching method developed by United States Steel. It removes heat quickly and evenly from every part of the material's surface. Elapsed time from quench to tempering treatment is held to an absolute minimum. This not only improves mechanical properties; it also reduces cracking. Furthermore, this quenching method improves machineability by minimizing formation of free ferrite in hypo-eutectoid steels.

The use of this quenching process is available to you without charge.

We do not manufacture or sell heat treating equipment, but our metallurgists will be glad to analyze your heat treating methods and make suggestions that may give you more uniform hardness, less rejects and less re-treatments.



UNITED STATES STEEL COMPANY, PITTSBURGH • COLUMBIA STEEL COMPANY, SAN FRANCISCO • TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM

UNITED STATES STEEL SUPPLY COMPANY, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST • UNITED STATES STEEL EXPORT COMPANY, NEW YORK



Carilloy Steels

ELECTRIC FURNACE OR OPEN HEARTH • COMPLETE PRODUCTION FACILITIES IN CHICAGO AND PITTSBURGH

9-1127

UNITED STATES STEEL

Observations

By Joseph Geschelin

Kettering Honored

On August 29, the city of Dayton observed a civic celebration in honor of the 75th birthday of one of its most

distinguished citizens—C. F. Kettering. Housed in Dayton's Memorial Hall was the Wonderland of Science Exposition, a display of developments in the arts and sciences in which Ket has had a hand during his career. An amazing

display of versatility and imagination, the Exposition gives a better picture of Kettering's influence and inspiration than anything we have seen before.

In a press conference, Kettering observed that in the near future we may easily expect an improvement of 25 per cent in motor car fuel economy through the development of high performance engines and improved fuels. He scoffed at talk of fuel shortages, mentioning that up to the present time, man has utilized only 0.1 of one per cent of the energy of the sun. Doubling this minute efficiency of utilization of solar energy would give us twice as much energy and materials resources.

He also dispelled—we hope—the feeling of the man on the street that atomic energy would ever be, or need ever be harnessed for driving automobiles and trucks.

1952 Models

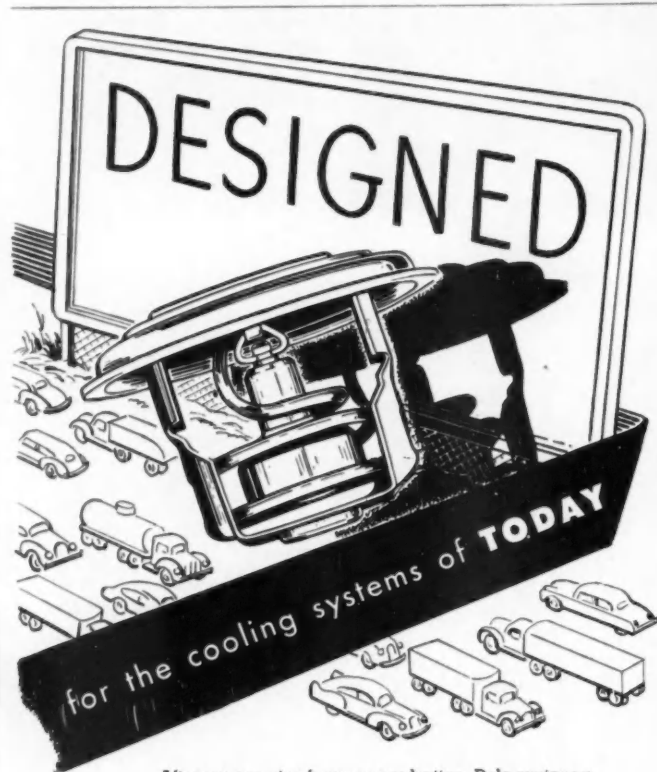
Were it not for the impact of the present war program throughout industry most passenger car engines for 1952 models would be freshly designed, of high compression, high performance type with overhead valve construction predominately.

Although manufacturers are not in the habit of showing their hand in advance, there is sufficient evidence in published reports and common gossip in informed circles to indicate the pattern. Of course it is an open secret that every manufacturer has built and road tested high compression, high performance engines. Introduction of such new designs, needless to say, is a matter of timing. At this point the chief reason for delaying the introduction of certain engines known to be in the works is the Washington bottleneck in the machine tool order board.

Additionally, there is the matter of investment in new tooling. Recently we took a ride in a car equipped with a new high compression overhead valve six. Although it has substantially the same displacement as the older L-head engine it delivers about 15 hp more and produces activity of amazing character. Introduction of this engine depends entirely upon when the company can afford to make the investment of many millions of dollars for tooling and machinery.

In General Motors today only Buick and Pontiac have continued with their current in-line 8's although it is general knowledge that both Divisions have been experimenting with V-8's. Conditions being what they are it is hardly likely that either one will announce a new engine in 1952 models.

In Chrysler the big and impressive 180-hp Chrysler V-8 unquestionably has set the pattern for other Divisions. In fact it has been common talk around Detroit that both Dodge and DeSoto would have V-8's for 1952. More recently, however, rumor has it that



After reconversion from war production, Dole engineers designed a completely new Dole Thermostat—announced in 1949—widely used today. This is the first thermostat developed especially to work with the smaller radiators, higher pump pressures and pressure caps used in today's sealed cooling systems. . . . Such development work is typical of Dole's cooperation with the industry's design engineers. This is how Dole has long served manufacturers in helping them achieve top performance for their products.

DOLE

CONTROL WITH DOLE

DV Thermostats

THE DOLE VALVE COMPANY
1901-1941 Carroll Ave., Chicago 12, Illinois
Detroit • Los Angeles • Philadelphia

DOOR OPEN

3

2

1

An Example of
CHECK MOTION
... in which a swinging
movement is stopped
at a predetermined
position.

If it needs to behave like a latch, a lock, or a linkage...
we can create it...mass produce it...WITH STAMPINGS!

You'll recognize the symbolic illustration above as an automobile door check application. We not only produce these and other "motion devices" for passenger car and truck doors... but also for station wagon tail gate supports and for rear door checks on panel trucks.

Our specialty is mass producing such assemblies—with stampings. Because we can make precision stampings of uniformly high quality and machine-assemble them in large volume, we are able to keep the prices unusually low. That's only one reason why

Standard is a leading supplier of door checking and latching equipment for the automotive industry.

We can design and produce door latches and strikers of all types, latches for deck lids and hoods—for either civilian or military equipment in the automotive and aircraft fields. Why not call us, or write for a copy of our new booklet, "We Make Motions".



THE REID DIVISION OF

The Standard Products Co.

THE MARK OF A
SUPERIOR PRODUCT



DEPT. G, GENERAL OFFICES: 2130 WEST 110 STREET • CLEVELAND 2, OHIO
DETROIT SALES OFFICE: 316 FISHER BUILDING, DETROIT 2, MICHIGAN

WE MAKE MOTIONS

MOTOR WHEEL CORPORATION

LANSING 3



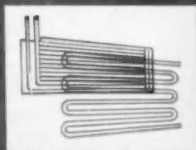
MICHIGAN

**finds PLATECOILS more
efficient - require 90% less cleaning**

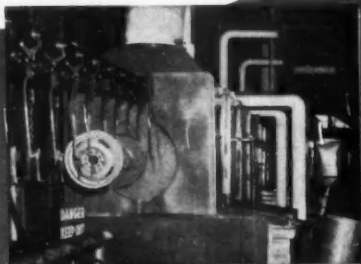
The advantages of Platecoils for tank heating and cooling make themselves felt in many ways. An example is the Motor Wheel Corporation, where Platecoils have replaced pipe coils for heating a bonderite washer. Mr. C. V. Lovell, Chief Draftsman, Maintenance Department, says Platecoils "are more efficient for the following reasons: "First, the scale formed by the solution does not adhere as readily to the smooth surface of the Platecoils and secondly, a large percentage of the scale that does collect is flaked off. Naturally this allows the Platecoil to be a better heat conductor . . ."

HOWEVER, THE GREATEST SAVING seems to be in the amount of time consumed in cleaning the coils. The pipe coil were cleaned every thirty days by the hammer and chisel method and required about five man hours per coil, including removal and replacement time.

The Platecoils are cleaned by brushing every sixty days and require about one man hour per coil including removal and replacement time. In terms of dollars and cents this amounts to a saving of approximately \$7.20 per coil per month . . .



A 24" x 47" Platecoil has the same heat transfer capacity as 32 ft. of 1 1/2" pipe, yet it takes only about 50% the tank space.



Write today for Bulletin No. 74

PLATECOIL gives you these ADVANTAGES

- /// Cleaned and Repaired Without Dumping Tank Solution
- /// Greater BTU Transfer Per Unit Area
- /// Weighs Only Half as Much as Pipe Coil
- /// No Threaded Joints in Tank
- /// Increased Tank Capacity
- /// Fast, Easy Installation
- /// Easy to Clean

PLATECOIL
Division
KOLD-HOLD MFG. CO.
LANSING 4, MICHIGAN

See us at the METAL SHOW — Booth G-345

these engines may come out early in '52, probably after the new models have been publicly released.

The Ford program has been in full view for a long time what with the engine plant now under construction in Cleveland. The well-informed around these parts look for a Ford overhead valve six, and an overhead valve Lincoln V-8 in the near future.

When Willys announced its F-head conversion of the Jeep four-cylinder engine, it seemed a foregone conclusion that an F-head six was just around the corner. Nothing has happened to refute this and it may be assumed that a high performance F-head six is very much in the picture in the near future.

Power Steering to Spread

Power steering is no longer new. It has been used in heavy duty off-highway equipment and in buses for some years. Both Saginaw and Ross have built heavy duty units with the Bendix hydraulic mechanism, and Vickers has had a hydraulic attachment for a number of years. But it is new for passenger cars and it remained for Gemmer, in cooperation with Chrysler, to introduce the first production application in Chrysler cars.

Many of our readers will recall the demonstration of hydraulic steering on a Cadillac, Buick Roadmaster, and a Studebaker Commander at French Lick in 1950. Some are convinced that Cadillac and Buick will have or should have hydraulic steering on at least certain models in 1952. In fact it sounds reasonable.

Electroplating Headaches

The electroplating situation is in quite a mess, perhaps we should say in a state of flux. Without nickel, the only recourse is to apply a chromium flash over bright copper, then apply a baked protective coating of lacquer. It is our feeling that at least some motor car producers would prefer to use paint and let it go at that, provided enough of competition would follow suit.

The only bright light on the horizon is the recent offering of the so-called "white brass" by du Pont. Recent conversations have made it plain that GM Divisions are giving this plating alloy considerable attention, although the major studies are being carried on at GMR. This alloy seems to hold a lot of promise assuming that proper mass production plating techniques can be developed. One thing that interests us about "white brass" is that it's an alloy developed by du Pont some years ago for a somewhat different class of application. Although its use was abandoned when production chromium plating became a relatively simple and low cost procedure, it is now revived in the hope of solving an immediate problem.

(Turn to page 146, please)

KELSEY-HAYES POWER BRAKING

ASSURES

CONTROL



Today's most advanced development in power braking is Kelsey-Hayes amazing "VACDRAULIC", forerunner of even more startling Kelsey-Hayes developments for tomorrow's motor cars.

Kelsey-Hayes "Vacdraulic" is the only unit to power the brake action instantaneously, with perfect "feather-touch" control, assuring perfect "pedal feel" in direct proportion to the pressure applied. Kelsey-Hayes "Vacdraulic" cuts foot pressure by as much as two-thirds that required for ordinary brakes!

"Vacdraulic", the only unit utilizing complete hydraulic control with a fixed reaction ratio, insures perfect "feather-touch" control at all pressures.

NOW! . . . Kelsey-Hayes "Vacdraulic" power brakes are standard equipment on over 100,000 cars of one of the world's leading automotive manufacturers. (Kelsey-Hayes engineers will gladly consult with you on the superior advantages of VACDRAULIC POWER BRAKES as original equipment on your new cars.)



ASSURES PROVEN PRODUCTS AT



DETROIT 32, MICHIGAN

PRODUCTS: Wheels—Hub and Drum Assemblies—Brakes—Vacuum Brake Power Units—for Passenger Cars, Trucks, Buses—Electric Brakes for House Trailers and Light Commercial Trailers—Wheels, Hubs, Axles, Parts for Farm Implements.
PLANTS: Kelsey-Hayes Plants in Michigan (4); McKeesport, Pa.; Los Angeles, Calif.; Davenport, Iowa; Windsor, Ontario, Canada.

NIAGARA

Accuracy in a squaring shear is dependent on rigidity of the shear's components and not upon any individual feature.

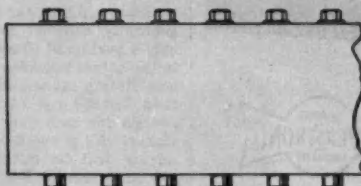
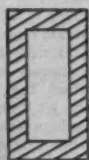
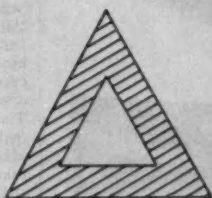
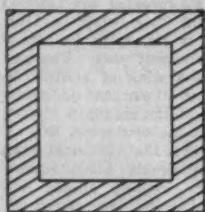
Sturdiness, convenience, speed and dependability are the result of experienced engineering and superb manufacture.

Latest type Niagara No. 810 Power Squaring Shear. Arranged with electro pneumatic tripping device operated by foot switch.



BASIC SHEAR DESIGN

Results in Accurate Cutting



● **BED, CROSSHEAD, HOLDDOWN and HOUSINGS** in NIAGARA UNDERDRIVE SHEARS are box sections to resist with minimum deflection the horizontal, vertical, diagonal or torsional stresses to which every shear is subjected. No other section will do the job as efficiently. This construction results in extreme strength and rigidity without resorting to deep beam sections which, in the bed, necessarily project below the floor line.

The simple, mechanically operated holddown having individual self compensating pressure feet, performs all required functions of a good holddown efficiently, effectively and quietly without using complex hydraulic circuits, pumps, valves, packings, cylinders, etc. and without generating heat. Maintenance costs are held to a minimum.

The drive is thru efficient spur gears mounted on anti-friction bearings and running in oil. It employs the famous Niagara 14 point instant engaging sleeve clutch. There are no sliding surfaces such as in worm gears and friction clutches to consume power, generate heat, and to wear rapidly.

***For Your
Defense Production***

NIAGARA MACHINE & TOOL WORKS • BUFFALO 11, N. Y.
Manufacturers of Presses, Shears, Machines and Tools for Plate and Sheet Metal Work
DISTRICT OFFICES: DETROIT • CLEVELAND • NEW YORK

AIRBRIEFS

(Continued from page 58)

by a propeller-turbine engine, which is a closed-cycle machine. The turbojet engine, most often rumored as the form the atom engine might take, needs the products of combustion as an additive to its jet efflux for efficiency, and this involves the expenditure of fuel the atom engine is designed to avoid. Most recent rumor in this department is that the Convair giant may well be a flying boat, rather than a landplane, in order

to permit experiments over infinitely-long runways and well away from prying eyes.

Banshee Enters Combat

Whether a police action or a full-scale war, Korea has provided an important combat proving ground for U. S. (and Russian) aircraft. The Air Force has sent in its latest and best aircraft in all categories but the Navy has confined the test to its Grumman F9F Panther jet fighter and the Douglas AD Skyraider. Now comes news that the McDonnell F2H Banshee jet fighter has gone into action aboard

carriers in the vicinity. In all departments the Banshee is a better-performing airplane than the Panther, but it is most superior in speed and ceiling, having exceeded 60,000 ft. in ceiling tests on numerous occasions. It can reach 40,000 ft. in only 7½ minutes and is the Navy's prime interceptor weapon, which explains why it has been held back so long. First combat reports of the Banshee vs the MIG-15 are awaited anxiously by the Navy and McDonnell Aircraft Corp. in St. Louis, Mo., who have long envied Grumman engineers their first-class proving ground in Korea.

Broader Wings for the Packet

Fairchild has revealed construction progress on the "big wing" C-119H Packet, which is scheduled for initial test flights early next year. The new model features a wing of greatly increased span and 40 per cent additional area over that of the standard Packet. The fuselage of the new model will remain the same but the additional wing area will permit greater loads, quicker takeoffs, slower landing speeds and shorter ground rolls, increasing the already-high versatility of the design.

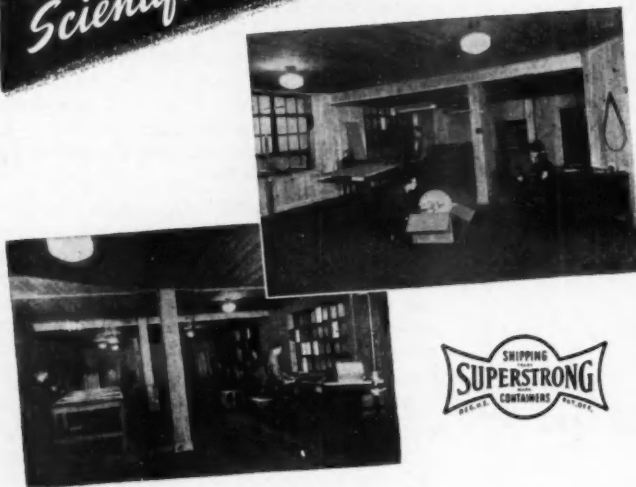
Air Refueling Grows

Boeing Airplane Co. announces that it has completed more than 8000 in-flight refueling contacts with its flying tankers, a figure far in excess of that generally believed heretofore. While only a portion of these contacts resulted in the actual transfer of fuel, nevertheless, Boeing tankers have pumped more than 750,000 gal of aviation fuel, or enough for well over 1000 jet fighter planes. All of the B-50 bombers now in service will be modified for in-flight refueling and all B-47 bombers coming off the assembly line at Wichita, Kans., are so equipped. The Air Force has successfully transferred fuel in flight to its North American F-86 Sabre, Republic F-84 Thunderjet and North American B-45 Tornado jet bomber, the first in the latter category to accomplish the feat. The size and scope of these tests point unmistakably to the thorough Air Force conviction that in-flight refueling is a basic part of modern aerial warfare.

Supersonic Flying Boat

From time immemorial the term "flying boat" has conjured up a vision of slowness, awkwardness and hugeness in the air, but persistent research has so solved the hydrodynamic and aerodynamic problems of the water-based airplane as to permit the construction of flying boats with supersonic speeds. Pioneering this work has been Ernest G. Stout, Assistant to the Chief Engineer, Consolidated Vultee Aircraft Corp., who has developed a "blended" (Turn to page 146, please)

CONTAINERS
Scientifically Designed



All of our boxes and crates are specially designed for YOUR product—in order to give it maximum protection with economy of weight and space. There is no attempt to fit your product into "standard" sizes of shipping containers.

The SUPERSTRONG laboratory—certified by the National Safe Transit Committee—is for both design and testing. Here a competent staff of shipping engineers works with the most modern equipment in order that SUPERSTRONG containers may be properly developed and designed.

We shall be happy at any time to discuss your shipping needs, and to place our facilities at your disposal. There is no cost or obligation for this service.



RATHBORNE, HAIR and RIDGWAY BOX CO.
1440 WEST 21st PLACE • CHICAGO 8, ILLINOIS

Bendix

STARTER DRIVE

PERFORMANCE

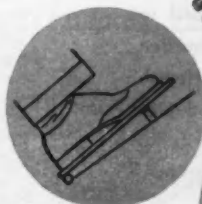
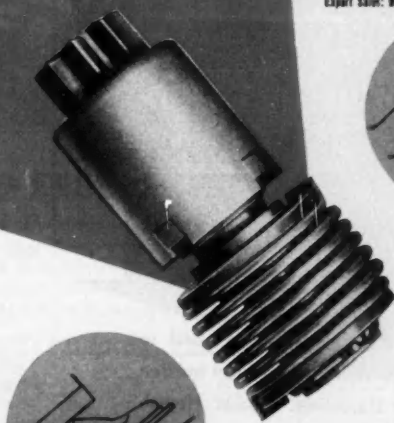
PROVEN

IN OVER

85,000,000

INSTALLATIONS!

SPECIALISTS
IN ALL TYPES OF
STARTING!



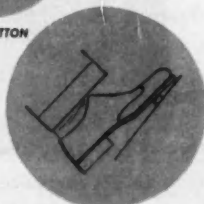
ACCELERATOR



CLUTCH PEDAL



PUSH BUTTON



FLOOR BUTTON



SWITCH KEY

Few products have ever won the overwhelming approval accorded the Bendix® Starter Drive. In automotive vehicles of all types, in the marine field, in stationary engines and aircraft, in fact wherever motors start, more than eighty-five million Bendix Drives have established an unrivaled record for dependable performance. Perhaps even more remarkable is the fact that in most installations manufacturers have paid less for the Bendix Drive than for other types. This unique combination of dependable performance and low cost is made possible by Bendix exclusive design features. For example, the Bendix Starter Drive requires no actuating linkage and the solenoid may be placed in any convenient position. Result—starting motor can be mounted more easily and in more positions. Also the Bendix Drive has fewer parts and needs no adjustments. If you want true economy, plus performance proven by over 85,000,000 installations, be sure to specify Bendix Starter Drives. Your inquiry will receive immediate attention.

REG. U.S. PAT. OFF.

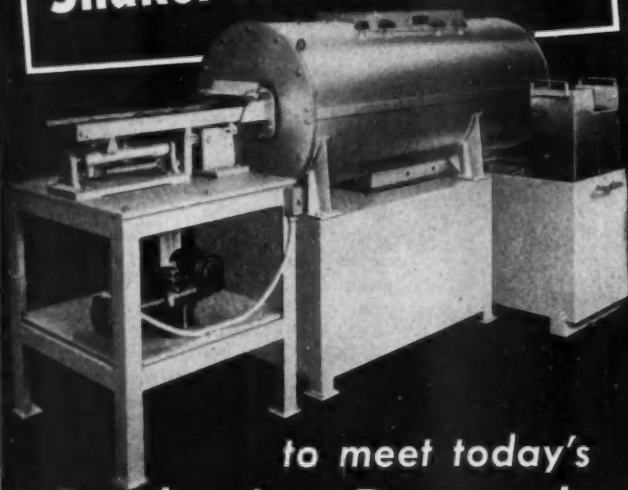
ECLIPSE MACHINE DIVISION OF



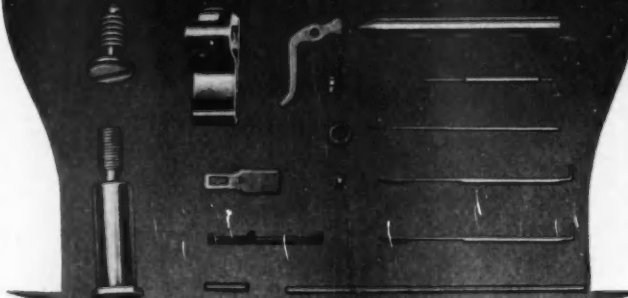
ELMIRA, NEW YORK

Export Sales: Bendix International Division, 72 Fifth Avenue, New York 11, N. Y.

use this HEVI DUTY Shaker Hearth Furnace



to meet today's
Production Demands



Hevi Duty Shaker Hearth Furnaces are used to bright carburize, bright dry cyanide or bright harden these small parts without distortion. Shaker Hearth furnaces process up to 150 lbs. per hour. Case depths are accurately controlled, and results are uniform. Learn more about this versatile Hevi Duty furnace.

Write for Bulletin HD-850 today.

HEVI DUTY ELECTRIC COMPANY

HEAT TREATING FURNACES **HEVI DUTY** ELECTRIC EXCLUSIVELY
DRY TYPE TRANSFORMERS — CONSTANT CURRENT REGULATORS
MILWAUKEE 1, WISCONSIN

CALENDAR

OF COMING SHOWS AND MEETINGS

- Second Conference on Industrial Experimentation, Dept. of Industrial Engineering, Columbia UniversitySept. 17-21
- American Society of Mechanical Engineers (fall meeting) Minneapolis, Minn.Sept. 25-28
- Nat'l Metal Trades Assn., Chicago, Ill.Sept. 26-28
- Sixth Annual Industrial Packaging and Materials Handling Exposition, Cleveland, OhioOct. 1-4
- SAE National Aeronautic, Production Forum, and Display, Biltmore Hotel, Los Angeles, Calif.Oct. 3-6
- Paris Automobile Show, Paris, FranceOct. 4-14
- 38th International Motor Exhibition, London, EnglandOct. 17-27
- National Metal Congress and Exposition, Detroit, Mich.Oct. 15-19
- ASTE South Central Conference, Evansville, Ind.Oct. 19-20
- SAE National Diesel Engine Meeting, Drake Hotel, Chicago, Ill.Oct. 29-30
- SAE National Transportation Meeting, Knickerbocker Hotel, Chicago, Ill.Oct. 29-31
- AGMA Semi-Annual Meeting, Edgewater Beach Hotel, Chicago, Ill.Oct. 29-31
- SAE National Fuels and Lubricants Meeting, Drake Hotel, Chicago, Ill.Oct. 31-Nov. 1
- American Petroleum Institute (31st Annual Meeting), Chicago, Ill.Nov. 5-8
- Second Annual Motorama, Los Angeles, Calif.Nov. 7-11
- American Society of Mechanical Engineers (annual meeting) ..Nov. 25-30
- Ninth Annual Pittsburgh Diffraction ConferenceNov. 29-30
- Motor and Equipment Wholesalers Ass'n (Annual Convention) Chicago, Ill.Dec. 5, 6, 7

1952

- Brussels Automobile & Truck Show, Brussels, BelgiumJanuary
- Plant Maintenance Show, Phila., Pa.Jan. 14-17
- SAE Annual Meeting, Detroit, Mich.Jan. 14-18
- Society of Plastics Engineers, Inc. (eighth annual technical conference), Chicago, Ill.Jan. 16-18
- National Transport Vehicle Show & Fleet Maintenance Exposition, New YorkFeb. 26-28
- Pacific Automotive Show, Los Angeles, Calif.Feb. 28-Mar. 2
- Fifth National Plastics Exposition, Phila., Pa.Mar. 11-14
- Geneva Automobile & Truck Show, Geneva, SwitzerlandMar. 20-30
- American Society of Lubrication Engineers, Seventh Annual Meeting and Lubrication Show Cleveland, OhioApr. 7, 8, 9
- Western Highway Institute, Palm Springs, Calif.Apr. 17-19
- API Div. of Refining, San Francisco, Calif.May
- American Society for Testing Materials (annual meeting) New York CityJune 22-27

It's both HEAVY-DUTY and PREMIUM



Sunoco's new Motor Oil
is one of the very few
that meets or exceeds
Auto Manufacturers'
Recommendations for
all Passenger Cars!

This NEW motor oil meets both
"premium" and "heavy-duty"
requirements *in a single oil*...
actually does the work of two
different types of oils...because
NEW Sunoco Dynalube is *both*
heavy-duty and premium.

Now...regardless of car man-
ual references to "premium"
and to "heavy-duty," you can
meet all recommendations and
still stock *only one oil* instead
of two.

You'll save money, time,
space and reduce inventory by
stocking NEW Sunoco Dynalube
—the heavy-duty premium
motor oil that costs no more
than many that give a lot less.



Memo to AUTO ENGINEERS

After road-testing NEW Dynalube and stripping down engines, the AAA certified these findings: "complete absence of injurious varnish or sludge"... "all piston rings were free and clean"... "no carbon built up on underside of valves"... "complete absence of rust on cylinder bores and other moving parts."



SAE West Coast Meeting

(Continued from page 33)

where operation on a commercial basis is entirely feasible, the decision was made to initiate a development testing program to determine the performance characteristics of a Cummins high speed Diesel engine supercharged with a turbocharger. The model NHRS engine was selected for this development. This is a six cylinder 5½ in. bore by six-in. stroke engine.

The purpose of this paper is to pre-

sent the initial results of this investigation. It should be understood that only preliminary development has been completed and that much more development is required to obtain a complete picture of turbocharging of the high speed Diesel engine; however, the initial investigation has highlighted the advantages, disadvantages, and possibilities of the turbocharger.

The maximum horsepower output of

the Cummins basic NH Diesel engine, rated at 200 hp, naturally aspirated, and 300 hp supercharged, with a Roots type blower, was increased by turbocharging to 339 hp for an increase in power of 70 per cent over the naturally aspirated rating, and 13 per cent over the Roots-charged rating, Fig. 1. Increased power output was accomplished with the same maximum fuel rate as used for the Roots-charged engine, or, in other words, with the same thermal load.



All these features and more are yours with Reevelec Induction Heating Equipment.

Whether you are building jet engines or a gear, a forty ton tank or an oil filter, we can show you lower costs, increased production and improved quality. Reevelec Induction Heating Equipment is available for hardening, brazing, tempering, soldering or any other application where metal must be heated with speed and accuracy.

Completely toolled systems can be furnished for high production operations. Write, call or wire.

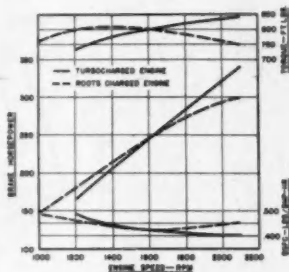


Fig. 1—Comparative performance curves for turbocharged and Roots-charged engines.

Full load performance characteristics of the turbocharged engine at low engine speeds were not as satisfactory as the Roots-charged engine. The power fell off and the fuel consumption increased on the turbocharged engine as engine speed was decreased, until at 1200 rpm the performance was approximately 10 per cent below that of the Roots-charged engine. This condition resulted in a continually falling torque curve as speed is reduced—a condition unfavorable for automotive applications. The shape of the characteristic performance curves of the turbocharged engine was responsive to changes in turbine nozzle area and modification of the engine fuel rate; however, in all cases, the shape of the

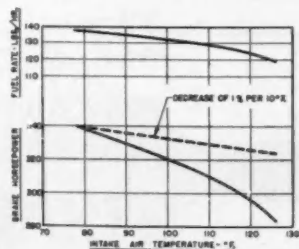
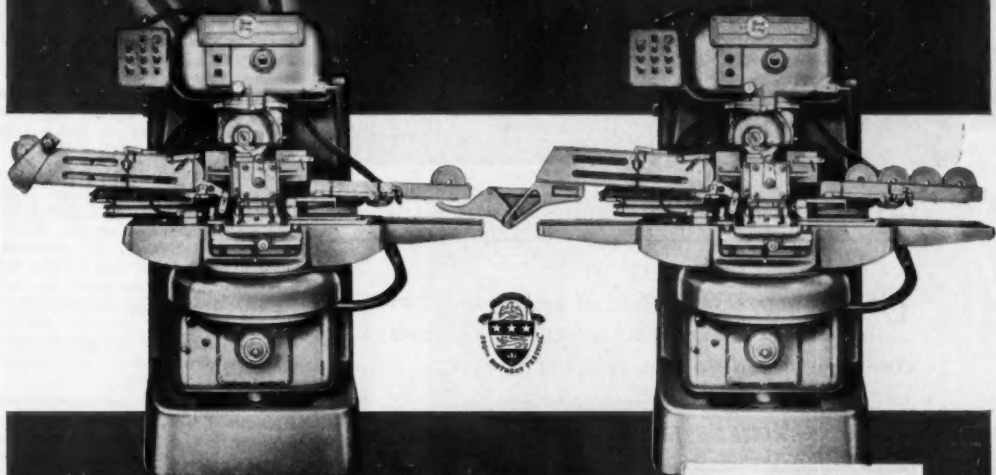


Fig. 2—Effect of intake air temperature on performance of turbocharged engine when influenced by turbocharger operational limitations.

RED RING Straight Line Automatic Loader

Saves Time and Conserves Manpower

In Shaving Cluster Gears



This new Red Ring Loader puts the shaving of cluster gears on a continuous automatic basis with important savings in time and manpower.

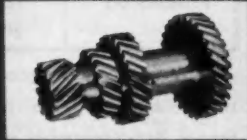
Although the illustration shows a battery for shaving a two step cluster, additional machine units may be added for as many additional steps as necessary.

All machines in such a battery are synchronized, but each unit is individually controlled and may be individually operated when desired. Each incorporates the universally accepted crossed axes principle of shaving.

A single operator is needed merely to supply unshaved gears to the magazine feed of the first machine and to remove the completed gears from the discharge chute of the final machine. All handling between machines is done by the automatic mechanical transfer mechanisms. All operations are in full view of the operator at all times.

Write for full description and savings.

SPUR AND HELICAL
GEAR SPECIALISTS
ORIGINATORS OF ROTARY SHAVING
AND ELLIPTOID TOOTH FORM



NATIONAL BROACH & MACHINE CO.

5600 ST. JEAN DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT



"RUDOLPH SAYS HE KNOWS THE TAPS WOULD LAST LONGER IF HE HAD THE RIGHT CUTTING FLUID ON THE MACHINE!"

USE OF the right cutting fluid for the job makes taps last longer, conserves critical tool steel, minimizes down-time, increases output. A typical example:

A large instrument manufacturer changed to Stuart's THREDKUT for tapping Allegheny metal.

	Before Using ThredKut	After Using ThredKut
Tap Life	2 hours	8 hours
Production	180 holes per hour	400 holes per hour

You just cannot ignore the fact that the cutting fluid used is a major factor in any machining operation. A Stuart Representative is prepared to show you how Stuart combines theory and practice to give you better operating performance. Ask to have him call.

Are you receiving Stuart's Shop Notebook regularly? Write, wire or phone.



STUART SERVICE
Goes with every Barrel

D. A. **Stuart Oil CO.**

2733 S. Troy St., Chicago 23, Illinois

performance curves could be improved only at the sacrifice of the maximum power output at maximum speed. There is some evidence that the additional gains could be made with a higher capacity turbocharger. It therefore appears feasible that by further development on matching of the turbocharger to the engine, plus possibly, modification of the engine fuel rate characteristics, that a satisfactory performance curve could be obtained on the turbocharged engine.

Increasing of intake air temperature can seriously decrease the maximum power output of a turbocharged engine if the increase in air temperature necessitates a reduction in the fuel rate to avoid exceeding maximum exhaust temperatures allowed by the turbocharger or the engine. Without exhaust temperature limitations, the rate of decrease in power with an increase in intake air temperature is approximately the same as for the Roots charged engine—one per cent per 10°F increase, Fig. 2.

Although effect of altitude was not determined, it is apparent that turbocharger operating limits would have considerable influence on the effect of altitude performance. If operational limits of rotor speed and exhaust temperature could be neglected, sea level engine power could conceivably be maintained at any altitude; however, since the limitations are approached at approximately sea level, such benefits may not be realized.

Consequently, the turbocharger must be designed with an ample margin of safety on both rotor speed and exhaust temperatures to compensate for extreme altitude and atmospheric temperatures.

Because of limited rate of acceleration of the turbocharger, the required air-fuel ratio for commercially acceptable exhaust smoke cannot be obtained on the turbocharged engine under all dynamic operating conditions.

By A. M. Brenneke
and A. J. Weigand
Perfect Circle Corp.

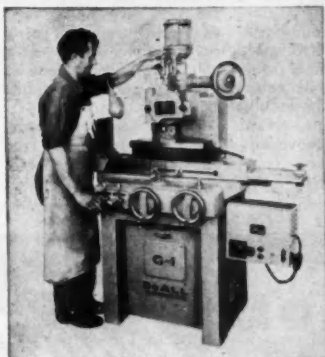
WHILE chrome plated compression rings have been a great boon to engine durability, ring manufacturers are still plagued by some problems, the most critical being excessive top-groove and top ring-side wear. Second in importance could be summed up into cylinder, ring and valve wear. These are grouped together because it seems that all three conditions are turning up simultaneously.

If the increased complexity of fuel composition is a contributing factor, our best hope for a quick solution lies in the direction of mechanical design. The effect of production, performance and economic pressures on the petroleum industry can be expected to lead to even further complications. Just as

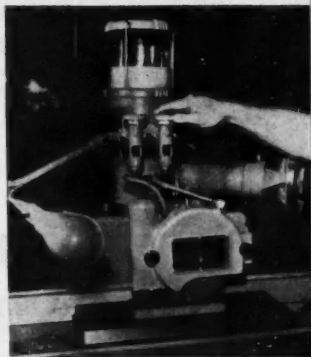
DoALL "COOL GRINDING"

U. S. Patent No. 2470350

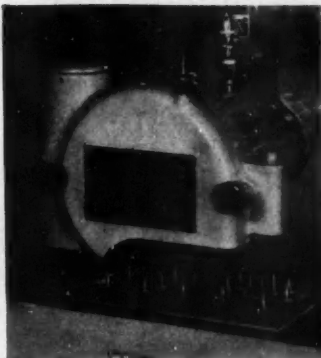
COOLS THE CUT AND THE WORK
NO BURNING OR CHECKING
FASTER GRINDING
GREATER ACCURACY
LONGER WHEEL LIFE
FULL VISIBILITY
NO SPLASH GUARDS
NO MESSY TANK OR PUMPS



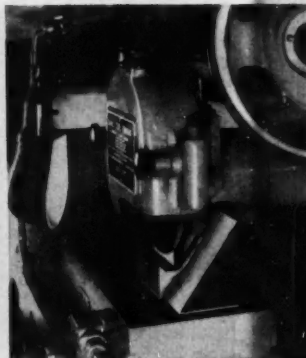
There is a DoALL Precision Grinder for every surface grinding requirement.



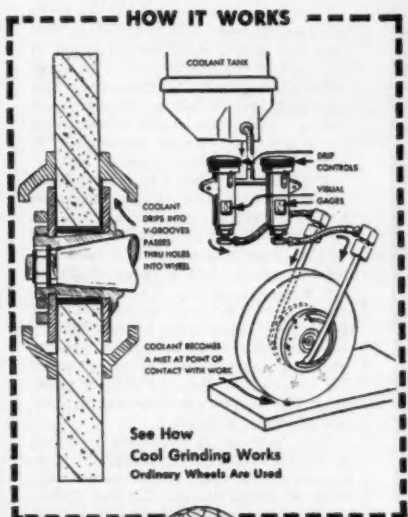
The coolant is metered to flow into and through the wheel.



Grinding piercing dies—a tough job done faster, better by "COOL GRINDING."



Full visibility of wheel and work—a big benefit in form grinding.



DoALL

27 SALES-SERVICE STORES

IN DoALL "COOL GRINDING" coolant flows *through* the wheel and atomizes at the point of work. Every cutting particle is surrounded by coolant. *Standard wheels are used.* The results are spectacular. Big time and labor savings, greater precision, longer life between tool grinds are just a few of the benefits. There is a complete line of DoALL Precision Grinders with "COOL GRINDING" for every toolroom and production job. Ask to have a **DEMONSTRATION** of one of these grinders in your own plant.

THE DoALL COMPANY, 254 N. Laurel Ave., Des Plaines, Ill.

SEND FOR CATALOG

Tells all about the benefits of "COOL GRINDING," shows DoALL Precision Grinders for every requirement.



GR-3

CALL DoALL FOR:



Machine Tools . . . Gaging Equipment . . . Tool Steel . . . Band Tools . . . Metal Working Supplies

SAE West Coast Meeting

(Continued from page 136)

we have always in the past found a way to remedy an existing condition, we will some day find the complete solution for this top groove and ring side wear. In the meantime considerable progress has been and is being made. Cast-in groove inserts, now successfully bonded into aluminum pistons, retard the side wear of the top groove and top ring. The principal piston manu-

facturers have made them available for various engines. There is a great deal of development going on at present to reduce their cost and considerable work is being done by piston manufacturers on entirely different designs of inserts.

In the field top groove spacers are being used with good results by truck and bus fleets, and some of the ring

manufacturers have developed special tools to remachine ring grooves to accommodate spacers above the top ring.

Cylinder materials are an item of design which have been overly neglected. Few engine builders have gone farther than to specify hardness and chemical composition. The more vital factors of microstructure and physical properties are seldom covered at all. Intense activity in engine development and the concentration of operators on reducing maintenance costs in the postwar period has stimulated considerable progress in this field. The most important factor in a cylinder material is its structure. Graphite is probably the most important constituent in cast iron which is intended to serve as a bearing. A graphite structure of a random type having a flake size No. 5 or 6 and Type A & B is almost universally accepted as a standard requirement for cylinder material. Large amounts of cementite and massive carbides are considered undesirable.

During the postwar period considerable difficulty was encountered both by engine builders in the process of developing new engines and by operators in maintaining existing engines with cylinder liner materials having improper microstructures. These materials were produced by the centrifugal casting process in cold molds. This material had a graphitic structure of the D & E type and extremely small flake sizes. Such structures are now generally prohibited by specifications but are still occasionally encountered. They are particularly susceptible to corrosive and scuffing types of wear.

Considerable reduction in cylinder wear and ring wear can be attributed to the increasing trend toward the use of fully hardened cylinder liners of the wet or dry type. The fully hardened liner is usually in the range of 450 to 550 Brinell hardness. The fully hardened liner is definitely to be preferred over the as-cast liner in the 200 to 300 Brinell range primarily for its greater resistance to abrasive wear. We believe that abrasive wear is probably the largest contributor to our overall wear problem.

The question is occasionally asked as to the relative compatibility with chrome plated rings of the as-cast and fully hardened liners. Chrome plated top rings may be used on either type of liner with complete assurance of excellent compatibility.

As to cylinder finish, we have little or no dispute in the recommendation of a 15 to 30 micro in. finish with a cross hatch pattern.

For the relief from oil control problems, we can foresee a decided increase of interest in chrome faced oil rings. At least one engine manufacturer has adopted a chrome plated oil ring, while a multiple piece, inner spring type chrome plated oil ring is made available in the aftermarket.

JOHNSON

Tappets

are made by Tappet Specialists

Thorough and complete attention by the entire Johnson Tappet organization to these important working parts of your engines assure you of maximum tappet life and performance.



SELF LOCKING TAPPET SCREW

Originated by Johnson this diaphragm type Self Locking Tappet Screw is operating successfully in millions of cast iron and steel tappets.

"Tappets Are Our Business"

JOHNSON PRODUCTS

INC.

MUSKEGON, MICHIGAN



AT THE ELBOW of the nation's mightiest fleets...in the service departments of tens of thousands of America's largest automotive repair shops...SUN Motor Testers and other SUN Scientific Testing Instruments are playing a vital role in strengthening the service arm of the nation to meet every emergency.

By substituting "Testwork" for "Guesswork", over 50,000 shops equipped with SUN Testing Instruments are helping to keep America's transportation system rolling. They are prolonging the life of needed motor vehicles...are saving

hundreds of thousands of precious man-hours and conserving the nation's highly skilled manpower.

For over a score of years, SUN has applied this background of scientific knowledge to industrial, military and governmental needs. SUN produces literally thousands of precision testing instruments for the nation's leading car factories, engine builders and other vital industries.

Further, SUN stands ready and willing to work with any agency in strengthening the service arm of the nation.



SUN

Sun

ELECTRIC CORPORATION

4373 Avondale Avenue, Chicago 31, Ill.

An Army of over 300 SUN Field Representatives keep the SUN Testing Program in high gear. They provide on-the-job training

for thousands of mechanics yearly...they service equipment and keep a constant check on the efficiency of scientific testing procedures. To insure a constant supply of highly skilled advanced operators, SUN also maintains 17 strategically located Technical Training Schools.

B-5810RR

AUTOMOTIVE INDUSTRIES, September 15, 1951

This DoALL Gage Equipment

makes
120,000
SNAP GAGES
accurate in millionths



at about 1/4 cent each!

A SET of 83 DoALL Gage Blocks plus the Gage Holders and Caliper Jaws illustrated gives you thousands of go and no-go snap and internal gages for a fraction of a penny each—in a jiffy. You get millionth accuracy and dimensional stability that you can depend upon.

DoALL Gage Blocks are no luxury. They are reliable, economical working tools every plant should have—dependable insurance against rejects. Ask to have a DEMONSTRATION in your plant. Call your local DoALL Sales-Service Store or write:

THE DoALL COMPANY, 254 N. Laurel Ave., Des Plaines, Ill.

MODERN MEASUREMENT CONTROL

Send for this new 20 page Bulletin describing DoALL Gage Blocks and Accessories. Ask about DoALL Calibration Service for your present gage blocks!



INDUSTRY'S
NEW
TOOLS

DoALL

27
SALES-SERVICE
STORES



Machine Tools . . . Gaging Equipment . . . Tool Steel . . . Band Tools . . . Metal Working Supplies

with that offered by private enterprise. There is no flexibility; drivers and vehicles are often unsuitable; breakages and delays are on the increase. Even the workers are disillusioned. If they have security of tenure, they are just wage earners without a share in either the ownership or control of the transport industry and they are not working with the same will and enthusiasm as under private enterprise. Incentives in the way of pay in excess of union standards, the possibility of a partnership or share in profits—always possible with smaller organizations—have disappeared and, whereas three round trips were normally oper-

ated between two centers of industry, these have now been reduced to two. Last year the Road Haulage Executive lost the equivalent of 12,270 days in consequence of strikes. There were 28 disputes involving 4557 men.

If the government was wedded to a nationalized road service, it has made no provision for the improvement of that service by providing adequate highways. In 1946 a 10-year program of highway development was announced and this was confirmed in May, 1949, by the passage of a Special Roads Act. But nothing has been done. British roads are totally inadequate for the volume of traffic they have to handle.

It has been proved by experience in other countries that with special motor roads the operating cost of a 10-ton truck could be reduced 32.4 per cent and that the saving with a three-ton truck would be 17.4 per cent. Most urgent need is between the industrial Midlands and the new factories established under government initiative in South Wales. Road conditions between these two points are described as appalling. This situation could easily be remedied by taking a small proportion from the £21,160,000,000 rearmament program. Another reform long overdue is the repeal of the 20 mph speed limit for heavy trucks.

Until comparatively recently complete nationalization of transport was the end-all of the present government. Now there has been a change, as shown by the official statements "Partial nationalization is the pattern chosen for road transport and the steel industry" and "Unless there is economic necessity, there is no reason for always socializing whole industries. For private and public enterprise to compete fairly with each other can be good for both."

The reply to this is that there is no fairness when three-quarters of the vehicles in the industry cannot go beyond a 25 mile limit without permission of the nationalized section operating the remaining one-quarter vehicles. Nor is it fair that free enterprise should be subject to objections to its licenses by the nationalized side which does not even have to hold a license for its vehicles.

Road haulage nationalization in England is a political measure. It is certain that if and when the present government is overturned there will be a return to free enterprise.

Send for Your Copy ...

pyrometer supplies buyers' guide No. 100-4

Today!

IT'S NEW!

IT'S COMPLETE!

IT'S YOURS FOR THE ASKING!



HERE'S the brand new edition of the Brown Pyrometer Supplies Buyers' Guide ... just off the press and designed to be even more helpful in your selection and ordering.

Included are standard and special thermocouple assemblies, elements and components ... protecting tubes and covers ... thermocouple and extension wire ... valuable technical data and basic prices ... and a host of other important information.

This buyers' guide is but part of

the complete service available to you through your local Honeywell Supplies Man ... with his HSM Plan for greater convenience and economy in all of your pyrometer supplies purchasing. Call him in for a discussion of your needs ... he is as near as your phone. Write for your copy of this new buyers' guide today!

MINNEAPOLIS-HONEYWELL REGULATOR CO., Industrial Division, 4548 Wayne Ave., Philadelphia 44, Pa.

Honeywell
Brown Instruments

PUBLICATIONS

(Continued from page 56)

D-93 Grinders

Mattison Machine Works—Catalog. No. 1901RM, covers rotary type surface grinders, with from one to five spindles, vertical spindle reciprocating surface grinders, traveling wheel face grinders and various type of disk grinders.

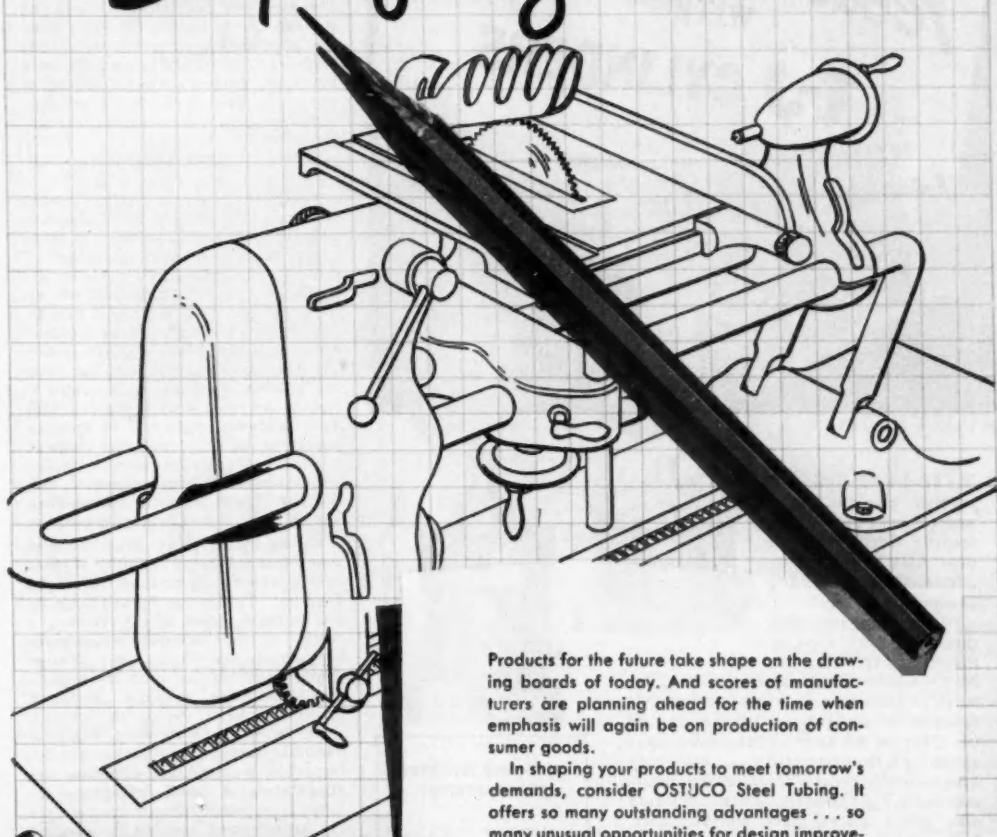
D-94 Plastics

Anchor Plastics Co., Inc.—The 1952 edition of an eight-page illustrated brochure "Extruded Plastics" has just been published.

D-95 Nylon Balls

Ace Plastic Co.—A two-page bulletin, No. NP-101, gives complete information on Nylon balls for valves, valve components, specialized anti-friction bearings, detents, mechanical checks and other industrial applications.

Shape of things to come...



Products for the future take shape on the drawing boards of today. And scores of manufacturers are planning ahead for the time when emphasis will again be on production of consumer goods.

In shaping your products to meet tomorrow's demands, consider OSTUCO Steel Tubing. It offers so many outstanding advantages . . . so many unusual opportunities for design improvements, increasing strength while reducing weight, enhancing beauty, and lowering production costs.

Because of the continuing needs of the military services, we cannot always promise early delivery estimates on new civilian orders. However, our experienced tubing engineers are at your service now to help give your product a future with OSTUCO Steel Tubing.

THE OHIO SEAMLESS TUBE COMPANY

Manufacturers and Fabricators of Seamless and Electric Welded Steel Tubing

Plant and General Offices: SHELBY 12, OHIO

From Your Blueprint . . . to Your Product

OSTUCO TUBING

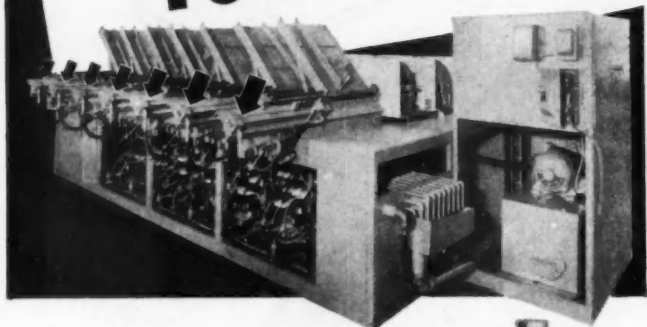


Tapering • Swaging • Flanging • Bending
Upsetting • Expanding • Reducing • Beading
End closing • Spinning • Drilling • Slotting
Notching • Flattening • Shaping • Trimming
Threading • Angle Cutting • And Many Others

SALES OFFICES: BIRMINGHAM, P. O. Box 2021 • CHICAGO, Civic Opera Bldg., 20 N. Wacker Dr. • CLEVELAND, 1328 Citizens Bldg. • DAYTON, 511 Salem Ave. • DETROIT, 520 W. Eight Mile Road, Ferndale • HOUSTON, 6833 Avenue W, Central Park • LOS ANGELES, Suite 300-170 So. Beverly Drive, Beverly Hills • MOLINE, 617 15th St. • NEW YORK, 70 East 43rd St. • PHILADELPHIA, 1613 Packard Bldg., 15th & Chestnut • PITTSBURGH, 1206 Pinewood Drive • ST. LOUIS, 1230 North Main St. • SEATTLE, 3104 Smith Tower • SYRACUSE, 501 Roberts Ave. • TULSA, 733 Kennedy Bldg. • WICHITA, 622 E. Third St. • CANADIAN REPRESENTATIVE: RAILWAY & POWER CORP., LTD.

Job File No. 3259

Feeds Automatically WITH T-J CYLINDERS



T-J Hydraulic Cylinders furnish efficient, automatic "push power" for feeding devices in this new Ajax-Northrup induction forge heating equipment.

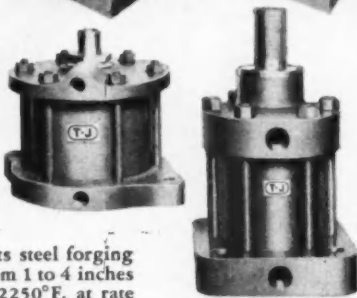
This unit—manufactured by Ajax Electro-thermic Corp., Trenton, N. J.—automatically heats steel forging stock in sizes ranging from 1 to 4 inches (rounds or squares) at 2250°F. at rate of 7500 to 8500 lbs. per hour. Has space for 8 heating stations . . . each with hydraulically operated billet feeding devices employing T-J Cylinders. These cylinders also eject heated bars automatically. Induction heating with this equipment results in uniformity of successive billets fed to the forge—thus controlling quality of finished forgings and reducing rejects.

Do you have a tough job in power movement—pushing, pulling or lifting? Let T-J help you *simplify machines, save labor and cut costs* by using T-J Air or Hydraulic Cylinders! Many standard sizes and styles . . . cushioned or non-cushioned . . . 100 lb. or 50,000 lb. Precision-built, long life. Write for more information. The Tomkins-Johnson Co., Jackson, Mich.

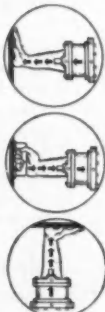
35 YEARS EXPERIENCE

TOMKINS-JOHNSON

RIVETERS AIR AND HYDRAULIC CYLINDERS CUTTERS CLINCHERS



FOR POWER MOVEMENT
IN ANY DIRECTION



100 LBS. or
50,000 LBS.

Hydroformer

(Continued from page 47)

The Fluid hydroforming process is based on extensive development work by Standard Oil Development Co., Standard Oil Co. (Indiana) and the Kellogg Co. It applies the Fluid catalyst principle—finely powdered catalyst supported on vapors and acting as a turbulent fluid—to the reforming of naphthas. This is the same principle which has been widely adopted throughout the world in the catalytic cracking of gas oils to produce high octane gasoline.

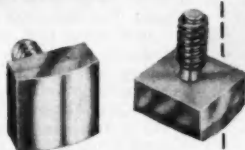
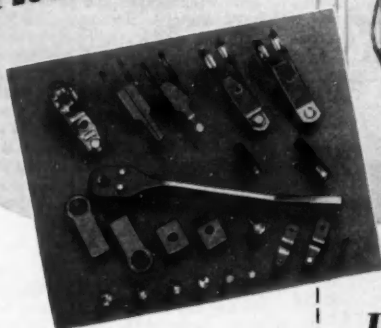
The new process has several advantages over the fixed-bed hydroformers built during the World War II emergency to provide vast quantities of toluene and avgas. In these earlier hydroformers, reaction beds had to be alternately taken out of product production while the catalyst was regenerated. The new Fluid catalyst system continuously withdraws catalyst from the reaction zone and regenerates it simply and cheaply. It is expected that daily operating costs will be approximately 30 per cent lower than those of a fixed bed with the same capacity. Furthermore, Kellogg estimates that this new type of unit will cost one-third less to build for equivalent capacities.

Kellogg pilot plant data indicates that yields will be on the order of three to five per cent higher than that of the fixed bed. This is due, by and large, to the uniform nature of the reaction, a result of the uniform temperature throughout the Fluid bed. Reactor pressures are also moderate in comparison with other catalytic reforming processes. As a result, the process shows better liquid recovery. The final gasoline product also contains less butane. This means that the refiner can advantageously blend extraneous butanes from other refinery sources into the hydroformed gasoline in bringing it up to the permissible 10-lb Reid vapor pressure.

In the operation, fresh feed is charged to an absorber from which it passes through exchange to the main heater where its temperature is raised to approximately 950 F. From there the feed is charged to the base of the reactor in which the Fluid bed is maintained. The vaporized naphtha passes up through the bed, where the hydrocarbon molecules are reformed from straight-chain paraffins to ring-type aromatics, and into the separation section above the bed level. After passing through cyclones at the top of the reactor to remove entrained catalyst, the reformed hydrocarbon vapors are transferred to the main fractionating tower and introduced at a point just above the slurry settler.

Taken off as bottoms from the tower

**Service
Beyond
The Sale!**



MALLORY TUNGSTEN CONTACTS

Although all Mallory tungsten is chemically the same, the size, shape and distribution of the grain particles are carefully controlled, since these factors vitally affect its electrical and mechanical properties. Mallory will gladly work with you to find the right contacts to meet your specifications. Write today.



Mallory Research Perfects Quantity Production Of Tungsten-Faced Stainless Steel Contacts

Years of Mallory research and development are now paying dividends to customers in the availability of Mallory contact assemblies incorporating the combined advantages of tungsten and special steels.

Recently a large aircraft manufacturer had an immediate requirement for tungsten contacts backed with stainless steel. Ordinary brazing technique would destroy the corrosion resistance and hardness of the steel. Mallory's production brazing technique was the only practical solution to the problem and delivery was made without delay... with contact assemblies that provided the corrosion resistance of stainless steel and maintained the hardness of the steel within 7 points Rockwell C. The special requirements of a customer were met by a Mallory technique that had been developed for just such a purpose.

That's service beyond the sale!

Mallory contact know-how is at your disposal. What Mallory has done for others can be done for you!

In Canada, made and sold by Johnson Matthey and Mallory, Ltd., 110 Industry St., Toronto 15, Ontario

Electrical Contacts and Contact Assemblies

P. R. MALLORY & CO. Inc.
MALLORY

P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

SERVING INDUSTRY WITH

Electromechanical Products

Resistors Switches
TV Tuners Vibrators

Electrochemical Products

Capacitors Rectifiers
Mercury Dry Batteries

Metallurgical Products

Contacts Special Metals
Welding Materials

is a certain small amount of relatively high boiling point polymer made during the processing. This is charged to a flash drum and recovered separately for petrochemical processing.

Principal product leaves the fractionator overhead and goes to a high pressure receiver which separates the hydrogen-rich gases from the gasoline. The gasoline is stabilized and sent to storage. The gases, after passing through heat exchangers, are recycled to the base of the reactor to maintain the required hydrogen-rich condition in the reaction zone.

The movement of the Fluid catalyst is similar to that in Fluid catalytic

cracking. From the reactor it passes through a stripper to remove and save hydrocarbon product and is then charged to the regenerator where the coke is burned off before it is returned to the reactor. Heat generated in regeneration is used to produce process steam through the use of an integrally contained boiler.

Varying operation conditions produce different yields and octane ratings. Under severe operation, the octane rating of the product is 95 CFR-R (clear).

Operating for the prime purpose of producing avgas base stocks, the aviation octane ratings reach 98, F-3 and

over 175, F-4, with the addition of 4.6 cc of tel per gallon.

In actual refinery practice, through blending of extraneous butanes, the total volume of finished gasoline approximates 100 per cent of the liquid charge volume.

AIRBRIEFS

(Continued from page 130)

hull-wing" design featuring swept or delta-wing shapes and powered by turbojet engines. In such a design, the hull and wing are virtually synonymous with the wing riding only slightly off the water during takeoff and landings. Stout has performed extensive research on dynamically-similar powered models of nine different designs as part of Navy project "Skate" and it is his conviction that the outstanding promise of such designs merits serious consideration in strategic planning.

Give It Back

In a move unprecedented under the present Administration, a Government agency has asked a contractor to "give back" some of the money he has been paid. The contractor is no less than the "big four" of U. S. airlines: American, Eastern, TWA and United, and the money is \$4,959,000 in claimed over-payments over the passed five years. The Civil Aeronautics Board has fixed C3¢ a ton-mile as mail pay for the years prior to 1951 and 45¢ a ton-mile for the current year. The back payments are assessed as \$3,430,000 for prior years and \$1,529,000 for the first quarter of 1951. Fortunately, these airlines have retained provisions in their book-keeping systems for just such rebates, long rumored in this long-fought argument before the Board.

OBSERVATIONS

(Continued from page 126)

Light Metal Radiators

Some comment has appeared recently regarding developments in aluminum radiators. Checking with our own sources we learn that complete aluminum radiator core assemblies for several makes of cars have been fabricated successfully and have undergone considerable experimental testing. Several major drawbacks in the picture make it doubtful whether production applications are in sight in the near future. For one thing, aluminum is just about as critical as copper and may not be made available for the purpose. Just as critical is the problem of service. Practically no one in the field today has the materials and know-how for repairing aluminum radiators. Apart from that, the aluminum assembly can be made perhaps half the weight of a conventional radiator.

METAL FORMING FROM

Cement Dies

No other company in the United States offers this diversified approach to your tooling problem, because we are not restricted in the type of die material to be used, or the type of presses upon which the part will be formed, as the quantity always determines the expenditure.

Die materials —
Steel
Hardwood
→ **KIRKSITE**
Masonite
Plastic
are available

Metals formed by —
Stretch Presses
Hydraulic Presses
→ **DROP HAMMERS**
Power Hammers
Mechanical Presses

Aluminum, steel
and magnesium
forming.

Sample work and
short run production
our speciality

Heat treat facilities for aircraft work.

Write for
DESCRIPTIVE
LITERATURE

HART PRESSED STEEL CORP.
ELKHART INDIANA

the word gets around fast

**Tops for coffee...
or tops for transmissions...
the word gets around fast!**

Sure, I'll tell you why I like the Fuller 10-speed ROAD RANGER.

Nobody shows their heels to me. I'm geared to get all the horsepower.

On the tough grades, the shifts are quick and easy, only 28% steps. When I shift, it's a straight shift.

How come? I shift only

one lever to get 10 speeds. I don't split gears. I shift 1-2-3-4-5, pull the range selector button, automatically move into high range and shift 6-7-8-9-10.

Nothing to worry about. My engine speed stays high. So does my average speed. I'm sold. That's why I'm helping to spread the word.

ROAD RANGER®



10-Speed ROAD RANGER

FULLER MANUFACTURING COMPANY (Transmission Division), KALAMAZOO 13F, MICHIGAN

Unit Drop Forge Division, Milwaukee 1, Wis. • WESTERN DISTRICT OFFICE (SALES & SERVICE—BOTH DIVISIONS), 1060 E. 11th Street, Oakland 6, Calif.

SIMONDS
ABRASIVE CO.

grinding wheels



'Mac' gets lots of attention now



How come? By breaking a production bottleneck. How so? By changing over to grinding wheels of slightly different grain and grade. What wheels? Simonds Abrasive Company wheels . . . part of a complete line that may hold the answer to your needs for top production efficiency. It includes grinding wheels, mounted wheels and points, segments and abrasive grain . . . industrially proven products of Simonds Abrasive Company, a major grinding wheel producer for almost 60 years. Write for free data book and name of your nearby distributor.

SIMONDS ABRASIVE CO. PHILADELPHIA 37, PA. BRANCH WAREHOUSES: CHICAGO, DETROIT, BOSTON
DISTRIBUTORS IN PRINCIPAL CITIES

Division of Simonds Saw and Steel Co., Fishburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

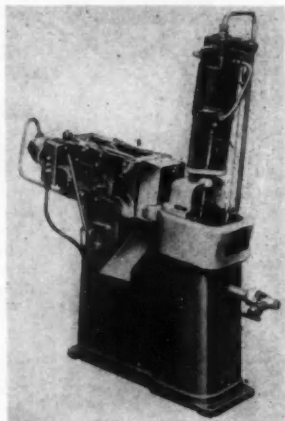
NEW PRODUCTION AND PLANT EQUIPMENT

For additional information please
use coupon on page 56

(Continued from page 60)

E-55—Die Casting Machine

Improved model IMP/96, a one lb die casting machine marketed by DCMT Sales Corp., New York, N. Y., has a pilot-operated impact type injection cylinder with slide valve in the



DCMT die casting machine, model IMP/96.

head, controlled by a trip lever and employing a safety interlock valve. Also incorporated is a double toggle air-operated die unit of larger capacity and locking load.

The IMP/96 operates on 80 psi of air and consumes only 0.55 cu ft of free air per cycle of operation.

E-56—Positioner Power Attachment

Recently redesigned is the Universal power attachment put out by the Aronson Machine Co., Arcade, N. Y., which is an optional extra on the firm's line of Universal balanced positioners. Characteristic features of the power unit are its infinitely variable speeds from zero to six rpm, and quick engage and disengage of the power transmission for use of power rotation or manual rotation and positioning.

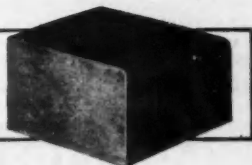
It has a worm and worm gear final drive which is adjustable, and a friction clutch coupling to allow positioning of the work piece on the rotational axis whether table is turning or not. Standard power required is 110/220 volt, single phase, 60 cycle.

SAVE STEEL . . . MANPOWER . . . MACHINING WITH
DISSTON HOT ROLLED SHAPES

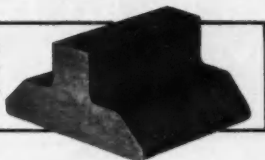
How Firestone Tire & Rubber Company saves 45.2%
 steel in making special jet engine container rims:



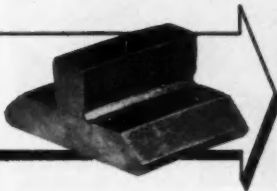
INSTEAD OF THIS—a full-section
 steel bar weighing 9.86 lbs. a ft....



THEY* START WITH THIS—a
 Disston Shape, hot-rolled to close
 tolerances, weighing only 5.4 lbs.
 a ft....



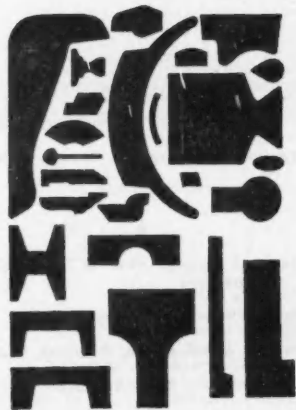
TO MAKE THIS—the finished rim
 weighing 4.14 lbs. a ft. Only 1.26
 lbs. need be machined off each ft.
 of metal instead of 5.72 lbs.!



*Machining and rim fabrication by
 Dresser Manufacturing Div., Bradford, Pa.



Firestone's jet engine container is in two
 halves which are attached by a series of clamps
 affixed to a machined rim. This rim is made
 from a special Disston Hot Rolled Steel Shape
 and helps make a joint capable of carrying
 structural loads.



A few of the many forms of Disston Hot
 Rolled Shapes now being used by industry.

This actual case history demonstrates typical savings
 made for many industries using Disston Hot Rolled
 Steel Shapes. Such shapes can be rolled in a variety of
 forms to meet exact specifications. Tolerances are close,
 and fine finishes can be furnished. These shapes can be
 made in either alloy or carbon steels, in both electric
 and open hearth grades. Disston engineers and metal-
 lurgists will be glad to work with you in developing the
 special shapes that will give you the greatest economies.
 Write us, specifying your needs.



SCRAP TURNED IN IS STEEL TURNED OUT!

Steel mills urgently need more scrap now! Help yourself
 get more steel by keeping your scrap moving into chan-
 nels serving steel mills.

HENRY DISSTON & SONS, INC.

931 Tacony, Philadelphia 35, Pa., U.S.A.

New Defense Facilities

SUPPLEMENTING the list of Certificates of Necessity issued up to July 27 authorizing new or expanded defense plant facilities for the manufacture of automotive and aviation war goods, which were published in the August 15 issue, page 116, of **AUTOMOTIVE INDUSTRIES**, the following additional certificates were announced by the Defense Production Administration between July 27 and August 18. Included in this latest tabulation, 3348 new or expanded defense facilities of all types have been

authorized for rapid tax write-off, the total amount eligible for amortization being \$9,151,251,007 as of August 18. The figure appearing in parenthesis is the percentage authorized for actual fast tax write-off.

— A —

Aero-Coupling Corp., Burbank, Calif.
Hose lines (aircraft)—\$72,230 (80)
Alloy Products Co., Marion, Indiana
Aircraft—\$97,027 (80)

American Bosch Corp., Springfield, Mass.
Fuel controls (aircraft)—\$434,453 (80)
Auto-Lite Battery Corp., Niagara Falls, N. Y.
Storage batteries—\$443,400 (75)
Auto-Lite Battery Corp., Owosso, Mich.
Storage batteries—\$41,787 (75)
Auto-Lite Battery Corp., Syracuse, N. Y.
Generator—\$157,882 (75)
Auto-Lite Battery Corp., Vincennes, Ind.
Storage batteries—\$60,761 (75)

— B —

Bard Parker Co., Inc., Danbury, Conn.
Aircraft parts—\$16,843 (75)
Beech Aircraft Corp., Herington, Kansas
Aircraft parts—\$2,230,979 (75)
Bell Aircraft Corp., Kenmore, N. Y.
Ordnance—\$232,302 (75)
Budd Co., Detroit, Mich.
Truck wheels, drums—\$106,872 (75)
Buerk Tool Works, Buffalo, N. Y.
Aircraft assemblies—\$17,517 (90)

— C —

C & D Batteries, Inc., Conshohocken, Pa.
Storage batteries—\$141,666 (75)
Cascade Manufacturing Co., Portland, Ore.
Truck attachments—\$109,395 (90)
Caval Tool & Machine Co., Newington, Conn.
Aircraft parts—\$56,423 (80)
Chicago Metal Hose Corp., Rock Falls, Ill.
Aircraft parts—\$8,328 (75)
Chrysler Corp., Detroit, Mich.
Shell bands—\$195,000 (75)
Consolidated Valtee Aircraft Corp., San Diego, Calif.
Airplanes—\$187,120 (75)
Criterion Machine Works, Beverly Hills, Calif.
Aircraft parts—\$15,983 (50)

— D —

DeLavan Mfg. Co., Des Moines, Iowa
Nozzles for aircraft—\$36,497 (90)
Diebold, Inc., Canton, Ohio
Castings for tanks—\$95,357 (75)

— E —

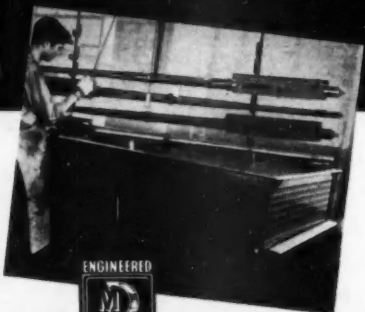
Eaton Mfg. Co., Marshall, Mich.
Rotor pumps—\$82,156 (80)
Edmunds Mfg. Co., W. Hartford, Conn.
Aircraft parts—\$8,552 (75)
Ellwood City Forge Co., Ellwood City, Pa.
Engine crankshafts—\$498,161 (75)

— F —

Fairchild Engine & Airplane Corp., Hagerstown, Md.
Airplanes—\$112,048 (85)
Federal-Mogul Corp., Detroit, Mich.
Bearings for engines—\$451,750 (85)
Fletcher Aviation Corp., Pasadena, Calif.
Aircraft fuel tanks—\$15,735 (85)
Formprag Co., Van Dyke, Mich.
Clutches—\$229,957 (80)
Frank Foundries Corp., Moline, Ill.
Liners for engines—\$30,000 (90)
(Turn to page 152, please)

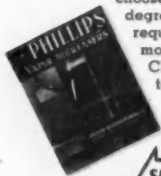
PHILLIPS degreasers used by Air Force for removing Cosmoline

**DEGREASING
EFFICIENCY
PROVED IN
WORLD WAR II**



Phillips Degreaser completely removes Cosmoline from four 20mm. guns in less than 4 minutes per gun.

BACK in the early days of World War II the government saw how important high speed removal of Cosmoline was to the war effort. The U.S. Air Forces' use of Phillips degreasers for handling one of the toughest metal cleaning jobs is proof that Phillips degreasers can and will help you increase production by solving your metal cleaning problems efficiently and economically. Out of the complete line you can choose a standard Phillips degreaser to meet most requirements. Special models built to order. Check with Phillips today!



Phillips Model 84 Batch Type Vapor Degreaser.

SEND FOR YOUR COPY OF NEW ILLUSTRATED BULLETIN



3465 Touhy Avenue • Chicago 45, Illinois
MANUFACTURING COMPANY
Engineered Metal Cleaning Equipment



**BATCH TYPE
DEGREASERS**



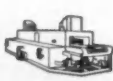
**COMBINATION
DEGREASERS**



**"ROTOMATIC"
DEGREASERS**



**CONVEYOR TYPE
DEGREASERS**



**"TORRENT"
WASHERS**



Complete Coverage



NATIONWIDE PRODUCTION *with regional economy*

Strategically placed near major markets, 13 Globe-Union factories are devoted to battery production. They offer to quantity distributors and manufacturers important transportation economies and faster service. Operating with identical methods and standards they also provide products which are reliably alike . . . dependably uniform in "spinning power," split-second starting and longer life.

BATTERY DIVISION
GLOBE-UNION INC.
Engineered Products for Industry
MILWAUKEE 1, WISCONSIN



FACTORIES SITUATED AT

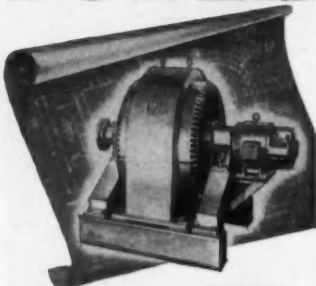
Atlanta, Ga.
Boston, Mass.
Cincinnati, Ohio

Dallas, Texas
Emporia, Kans.
Hastings-on-Hudson, N. Y.

Los Angeles, Calif.
Memphis, Tenn.
Mineral Ridge, Ohio

Oregon City, Ore.
Philadelphia, Pa.
Reidsville, N. C.

for custom-engineered POWER



look to... **EP**

Since 1909, the job of The Electric Products Company has been to create and develop special electrical rotating equipment . . . motors and generators to do existing jobs better or to reach into new fields to do jobs that couldn't be done before. The natural "by-product" of our more than 40 years of specialization is that you get equipment designed and built to the exact requirements of your application . . . equipment that has greater dependability, longer life and that requires less maintenance.

Send in the coupon below for detailed information about our Custom-Engineered synchronous motors and generators . . . d-c motors and generators . . . induction motors . . . battery chargers . . . frequency converters.

A nation-wide sales engineering and service organization stands ready to meet all User requirements.

THE ELECTRIC PRODUCTS COMPANY



17250 CLARKSTONE ROAD
CLEVELAND 12, OHIO

Attach coupon to your
letterhead for your copy
of Bulletin 2-200

NAME _____
TITLE _____
COMPANY _____
STREET _____
CITY _____ ZONE _____ STATE _____
X-14

— G —

General Motors Corp., Anderson, Ind.
Starting, lighting & ign. equip.—\$4,381,940 (75)
Components—\$7,812,000 (75)
General Motors Corp., Bedford, Ind.
Ordinance—\$236,635 (75)
General Motors Corp., Flint, Mich.
Computers—\$6,512,500 (75)
Transmissions—\$2,358,965 (75)
Ordinance—\$68,581,650 (75)
General Motors Corp., Grand Blanc, Mich.
Tanks—\$1,578,218 (75)
General Motors Corp., Harrison, N. J.
Roller bearings—\$6,219,557 (75)
General Motors Corp., Moline City, Ohio
Aircraft—\$5,718,823 (75)
General Motors Corp., Pontiac, Mich.
Ordinance—\$15,648,920 (75)
General Motors Corp., Rochester, N. Y.
Fuel control—\$2,310,600 (75)
General Motors Corp., Saginaw, Mich.
Malleable castings—\$1,380,500 (75)
General Motors Corp., Sandusky, Ohio
Ball bearings—\$4,599,700 (75)
General Motors Corp., Vandalia, Ohio
Propeller assemblies—\$4,007,779 (75)
Grand Central Aircraft Co., Tucson, Ariz.
Reactivation of aircraft—\$25,011 (85)
Green Machine Co., Inc., Glastonbury, Conn.
Aircraft parts—\$18,877 (90)
J. W. Greer Co., Wilmington, Mass.
Tank components—\$1,350,000 (75)

— H —

Haber Corp., Chicago, Ill.
Aircraft parts—\$274,670 (85)
Hansen-Lynn Co., Inc., Burbank, Calif.
Throttle controls—\$14,965 (80)
Holley Carburetor Co., Detroit, Mich.
Aircraft controls—\$152,340 (85)
Holley Carburetor Co., Van Dyke, Mich.
Aircraft controls—\$13,587 (75)
Automotive carburetors—\$411,297 (75)

— K —

Kelsey-Hayes Wheel Co., Detroit, Mich.
Hub assemblies—\$352,955 (85)
Keystone Engineering Co., Los Angeles, Calif.
Aircraft parts—\$141,139 (80)
Koppers Co., Inc., Baltimore, Md.
Piston rings—\$165,672 (85)

— L —

Lear, Inc., Elyria, Ohio
Vacuum pumps—\$27,037 (85)
Lewis-Shepard Co., Watertown, Mass.
Electric & fork trucks, power hand trucks—\$141,000 (80)
Fork trucks, stackers, storage racks—\$198,887 (80)
Longren Aircraft Co., Torrance, Calif.
Wing attach fittings—\$12,402 (80)

— M —

The Maxim Silencer Co., Hartford, Conn.
Mufflers (tanks)—\$40,033 (80)
Monroe Calculating Machine Co., Morris Plains & Monroeville, N. J.
Aircraft instruments—\$1,957,045 (80)
Murphy Diesel Co., Milwaukee, Wis.
Diesel engines—\$69,534 (75)

— N —

Novi Equipment Co., Novi, Michigan
Engine governors—\$140,000 (75)
(Turn to page 154, please)

QUALITY CONTROLLED

Theoll

SCREWS, BOLTS, NUTS
and SPECIAL FASTENERS



SAVE STOCKROOM TIME

Requisitions to your stockroom for Pheoll Fasteners can be filled in less time. Boxes, kegs and packages are plainly marked with sizes clearly indicated for rapid identification. Pheoll's quality products handle easily, can be quickly counted or transferred to bins or assembly line trucks.

REDUCE ASSEMBLY TIME

Workmen gain time assembling with Pheoll screws, bolts, and nuts because they are accurately threaded, drive easily, seat rapidly, grip tighter—assuring stronger assemblies, easier inspection and less rejects.

IMPROVE YOUR PRODUCT APPEARANCE

The uniform quality of Pheoll Fasteners improves your product appearance. Precision slotted and finished heads, cleanly chamfered nuts, prevent marred surfaces and add to your product's sales appeal. Write for Pheoll literature and price list.

Save Costs... Increase Profits
with these Pheoll Fasteners

ASK ABOUT PHEOLL Machine Screws
Machine Bolts Special Screws and Bolts
Cap Screws Machine Screw Nuts Wood
Screws Thumb Screws Brass Washers
Stove Bolts

(Furnished in slotted
and Phillips Recessed Head Types)



NEW TEN-TON CARGO CARRIER Designed and built at the Detroit Arsenal, this unique Model 51 Truck-tractor features a body design of extremely light weight in proportion to its load carrying capacity. Front and rear axles operate as independent unit for fuel articulation. South Wind "winterized"—a "978" heater keeps frost off the windshield ... freezing cold outside the cab.



NOW...ARMY GETS "TROPIC" HEAT AMID "ARCTIC" COLD

Amazing New Military Heater Keeps Vehicles Warm Even at 70 Below!

Hard to imagine! The mid-summer, tropic heat inside these new military vehicles while outside temperatures range from 90 to 70 degrees below. And yet it's true. The result of a revolutionary new heater—the South Wind "978."

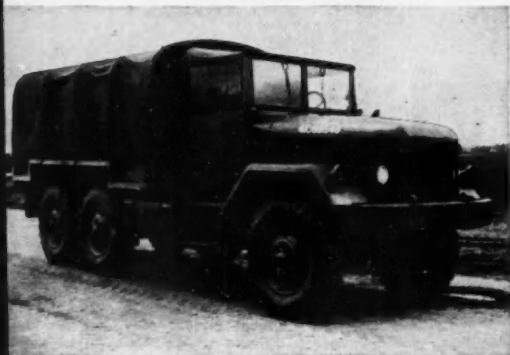
Simplified in design. Compact. This rugged forced air heater preheats, heats and defrosts in any type of military vehicle—in temperatures as low as 70° below zero. Dependably safe because the combustion air system is completely separated from the ventilating air stream. Always fast acting because warm air circulation doesn't depend on engine heat.

Built to Army Ordnance specifications, the "978" has been widely accepted by the Army for its winterization program. And because of its many exclusive advantages, promises to be influential in guiding future designs for commercial car heating, too.

REMEMBER: This is the only heating equipment available that meets winterization specifications for Ordnance vehicles. Write or call for information regarding your requirements. Get the experienced counsel of trained South Wind engineers. Address Stewart-Warner Corp., South Wind Division, 1514 Drover Street, Indianapolis, Indiana.

STEWART-WARNER

PERSONNEL HEATING *South Wind*
ENGINE AND EQUIPMENT PRE-HEATING
WINDSHIELD DEFROSTING



NEW REO "EAGER BEAVER" Army's newest six-by-six . . . 2½ ton heavy duty utility vehicle and cargo carrier. Can travel up 60° grades or under water. A South Wind "978" defrosts windshield, keeps cab and personnel warm.

NEW "ACK-ACK" GUN CARRIAGE Mounts twin 40 mm. anti-aircraft guns. Equipped with two South Wind "978's." One for personnel heating inside, and one in the gun turret to heat the turret components.



— O —

Oro Mfg. Co., Adrian, Mich.
Seat assemblies (aircraft)—\$34,698 (80)

— P —

Pierce Governor Co., Inc., Anderson, Ind.
Controls for aircraft—\$157,492 (80)

— R —

ResistoBox Corp., Belleville, N. J.
Aircraft hose assemblies—\$37,500 (75)
Revere Corp. of America, Inc., Wallingford, Conn.
Aircraft equipment—\$694,552 (75)

— S —

S. & Z. Machine Tool & Die Co., Cleveland, Ohio
Panel instruments, latch assembly for tanks—\$55,628 (80)
Simplex Piston Ring Mfg. Co., Miami, Fla.
Shaft seals, piston rings—\$80,051 (80)
Standard Steel Spring Co., New Castle, Pa.
Flat leaf springs—\$78,238 (80)
Stewart-Warner Corp., Chicago, Ill.
Grease fittings—\$53,638 (90)

— T —

Tinnerman Products, Inc., Cleveland, O.
Bead clips—army ordnance—\$16,470 (90)

Torrington Co., Torrington, Conn.
Anti-friction bearings—\$625,000 (75)

— U —

U. S. Rubber Co., Chicago, Ill.
Fuel cells—\$49,153 (75)

— V —

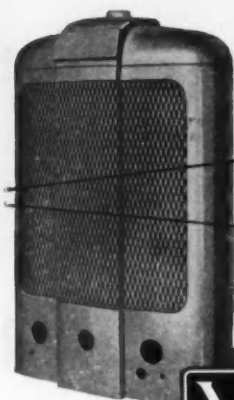
Vahl Engineering Co., Brooklyn, N. Y.
Aircraft—\$75,048 (75)

— W —

Warner Machine Products, Inc., Muncie, Ind.
Universal joint, assy. parts—\$398,820 (75)
Wausau Motor Parts Co., Wausau, Wis.
Piston rings—\$46,527 (80)
The S. K. Wellman Co., Bedford, Ohio
Clutch friction elements—\$517,405 (75)
Western Automatic Machine Screw Co., Elyria, Ohio
Fuel metering equipment—\$532,370 (85)
Westinghouse Electric Corp., Lester, Pa.
Ordinance—\$341,157 (75)
Westinghouse Electric Corp., Pittsburgh, Pa.
Aircraft—\$134,840 (75)
White Motor Co., Cleveland, Ohio
Engines for half-trac—\$58,937 (85)
Tank assys.—\$413,170 (85)

— Y —

Yale & Towne Mfg. Co., Phila., Pa.
Electric industrial trucks—\$2,114,865 (75)



Rate 'em HIGH...

Run 'em HARD...

with the help of



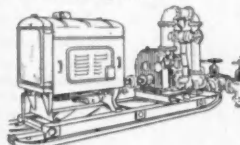
**Power Unit
RADIATORS**

POWER unit owners want heavy-duty dependability . . . plus top-rated power for the weight and space. Both these requirements call for reliable, effective cooling . . . just one more reason why leading manufacturers specify Yates-American radiators for their engines.

Yates-American engineers work hand-in-hand with power unit builders, cooperating to produce radiators that fit specific needs. Yates' craftsmen follow up, too — using top-quality materials to insure long life and trouble-free service. As a result, Yates-American radiators can be found wherever efficient, reliable cooling systems are a must — trucks, tractors, compressors, excavators, locomotives, power plants.

Check now . . . apply the advantages of Yates-American equipment to your heat-transfer requirements. Write today for complete information and descriptive literature.

The Yates-American radiator shown above is a typical power unit type—one-piece core, and either cast or sheet metal tanks and sides . . . always designed to meet user specifications.



YATES-AMERICAN MACHINE CO.

HEAT TRANSFER PRODUCTS DIVISION

• BELOIT, WIS., CHICAGO, ILL.

News of The Industry

(Continued from page 23)

Fairfield Mfg. to Build New Plant

Construction of a new \$2.5 million plant has been announced by Fairfield Manufacturing Co., Lafayette, Ind. Already started under a contract awarded to the Austin Co., Cleveland, O., it is expected that the building will be ready for occupancy before the end of 1951. The new structure will provide Fairfield with 181,000 sq ft of floor space to house office, engineering, and manufacturing departments.

Jominy Urges World Panel on Metal Substitutes

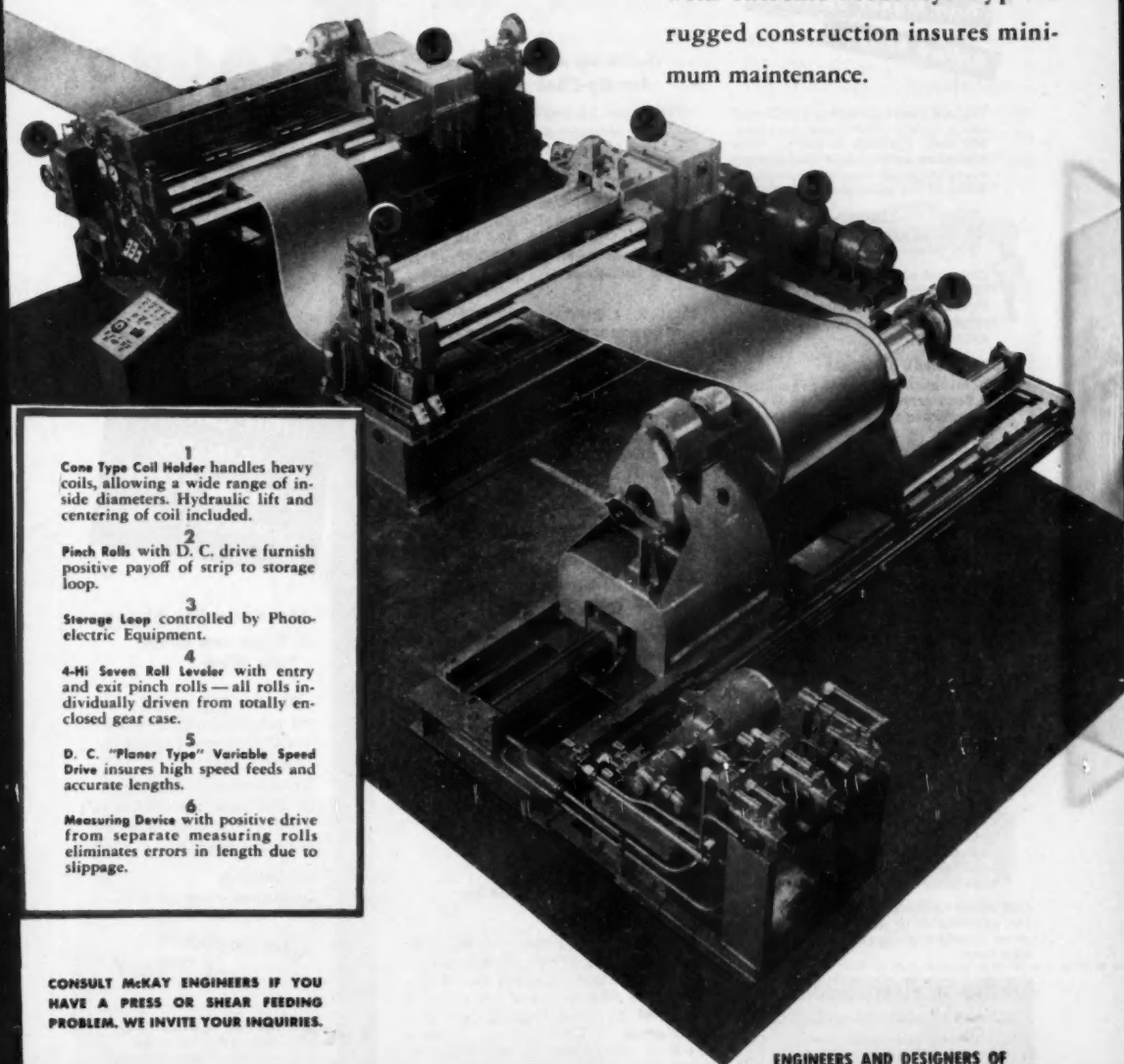
Formation of an International Committee on Metal Substitutes has been urged by Walter E. Jominy, president of the American Society for Metals and chairman of the Government's Panel on Conservation of Alloys and Engineering Steels. Mr. Jominy, who is chief metal scientist for Chrysler Corp., states that such a committee of representatives from America and Marshall Plan countries should be set up at the World Metallurgical Congress in Detroit, Oct. 14-19. He said that knowledge gained by American metallurgists from work of boron steels can prove

MCKAY

PRESS FEED AND CUT-UP LINE

A New Answer to **COIL FEEDING** *Problems*

Incorporating the latest in D.C. drive and control, McKay's new feeding line provides high production with extreme accuracy. Typical rugged construction insures minimum maintenance.



¹
Cone Type Coil Holder handles heavy coils, allowing a wide range of inside diameters. Hydraulic lift and centering of coil included.

²
Pinch Rolls with D. C. drive furnish positive payoff of strip to storage loop.

³
Storage Loop controlled by Photoelectric Equipment.

⁴
4-Hi Seven Roll Leveler with entry and exit pinch rolls — all rolls individually driven from totally enclosed gear case.

⁵
D. C. "Planer Type" Variable Speed Drive insures high speed feeds and accurate lengths.

⁶
Measuring Device with positive drive from separate measuring rolls eliminates errors in length due to slippage.

CONSULT MCKAY ENGINEERS IF YOU
HAVE A PRESS OR SHEAR FEEDING
PROBLEM. WE INVITE YOUR INQUIRIES.

ENGINEERS AND DESIGNERS OF
EQUIPMENT FOR THE AUTOMOTIVE,
FABRICATING AND STEEL INDUSTRIES

The MCKAY MACHINE Company
YOUNGSTOWN, OHIO



DEPEND ON *Mitchell* FOR THESE SPECIALIZED PRODUCTS

Ignition Switches
Turn Signal Switches
Rolled Shapes

Widely used by leading builders of cars, trucks, buses and tractors, Mitchell ignition switches, turn signal switches and rolled shapes meet the most exacting specifications of the automotive industry.



**AUTOMOTIVE
IGNITION SWITCHES**

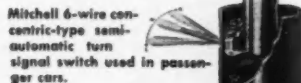
Original equipment on many popular make vehicles, Mitchell ignition switches are noted for extra long life. "Radio" position at no extra cost.

TURN SIGNAL SWITCHES

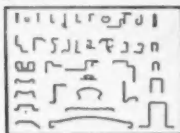
Semi-automatic, self-cancelling. Afford drivers easy, positive way to indicate turns to approaching and following traffic as well as to pedestrians.



Mitchell clamp-on and screw-type semi-automatic turn signal switch for trucks, cars, buses, tractors.



Mitchell 6-wire concentric-type semi-automatic turn signal switch used in passenger cars.



**ROLLED
SHAPES**

Complete range of metals, designs and gauges in stainless steel, aluminum, brass, bronze, copper—cold rolled, drawn and pressed—for automobiles, airplanes, railroad cars, architectural requirements, radios, television receivers, all industrial uses.

Our sales engineers work with you in the application of Mitchell products to your specific designs. Call on us at any time.

UNITED SPECIALTIES COMPANY
Mitchell Division, Philadelphia 36
Ignition and Turn Signal Switches •
Rolled Shapes • Dovetails
UNITED AIR CLEANER DIVISION
CHICAGO 28
Air Cleaners • Metal Stamping

Industry News

(Continued from page 154)

advantageous to other countries and that "we expect to learn from them processes that they developed during World War II when they went without metals we still consider essential." He added that the Detroit meeting will be the first organized exchange of such information and that as a result of the meetings, present alloy formulae may be found outdated and wasteful.

Northrop Licenses Turco for Dy-Chek Materials

Northrop Aircraft, Inc., awarded an exclusive license to Turco Products, Inc., Los Angeles, for the manufacture and marketing of all materials used in the Dy-Chek dye penetrant inspection process. Developed originally by Northrop for inspection of high performance gas turbine parts, the Dy-Chek process has found wide application in the metals industries.

Magnecord Establishes New Laboratory

Magnecord, Inc., has established a new engineering development laboratory in Chicago. Over 7000 sq ft of space will be devoted to standard equipment development and specialized research. The engineering, model-making, drafting and experimental laboratory departments of Magnecord will be housed in these new quarters.

Allis-Chalmers Buys Canadian Plant

Purchase of the St. Thomas, Ont., Canada, Works of Allis-Chalmers Rumely, Ltd., by Canadian Allis-Chalmers (1951), Ltd., has been announced. The St. Thomas Works was built in 1948. The plant was purchased by Allis-Chalmers Rumely from Erie Iron Works in September, 1950. Both Canadian Allis-Chalmers (1951) and Allis-Chalmers Rumely are subsidiary firms of Allis-Chalmers Manufacturing Co., Milwaukee, Wisc.

More Information on B-52

Further information on the B-52, which the U. S. Air Force will use for intercontinental bombing if World War III can be delayed for a few years, is contained in recently-published testimony given by USAF officers before a House appropriations subcommittee. First four models of the all-jet plane, now referred to as the B-52 by the Air Force, cost more than \$21 million each, of which the tooling cost per plane was

PAGE WIRE

**ROUND
FLAT
OR
SHAPED**

**LOW CARBON
HIGH CARBON
STAINLESS
SPECIAL ALLOY
ARMCO IRON**

**You draw the Shape
—Page can draw
the Wire**

—the way you want it for your production—whether it's ALL of your product, or only a part.

Cross-sectional areas up to .250" square; widths to 3/4"; width-to-thickness ratio not exceeding 6 to 1.

for Wire or
Information about Wire—

*Get in touch
with Page!*

CO Monessen, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Portland, San Francisco, Bridgeport, Conn.

PAGE STEEL AND WIRE DIVISION
AMERICAN CHAIN & CABLE

Here's Where You Come In!

That's right—from here on you can just about write your own ticket! Think of the most exacting assignment for small lathes anywhere along your production lines. Then tell us about it. We'll deliver a high-speed, sensitive Monarch 10" Model EE—a lathe with an inbuilt productivity matched only by its versatility—and you'll get it with just the equipment and accessories to step up standards for that job.

Note the listing of typical equipment (right). An extraordinarily large choice is available, making it possible for the user to select the ideal combination for the utmost productivity on his class of work. The Model EE is equally adaptable for a wide variety of between center and chucking operations. Note, too, that it can be supplied with the most accurate lathe duplicating method ever devised—the Monarch "Air-Gage Tracer."

These many variations in equipment have been developed solely in response to industry's demands

that we make the basic Model EE design available for constantly widening uses. Could anything we say speak better for its design and specifications? Some place—many places, perhaps—this outstanding Monarch lathe can improve your production at lower cost. Send the coupon today for full details
The Monarch Machine Tool Company, Sidney, Ohio.

TYPICAL EQUIPMENT

- "Air-Gage Tracer"
- Steady rest
- Follow rest
- Taper turning attachment
- Collet attachments
- Air equipment
- Bar feed attachments
- Collet chucks
- Jaw chucks
- Step chucks
- Stops
- Micro-gaging diameter dial
- Hexagon power feed bed turret
- Hand operated cut-off slide
- Variable feed control
- Ball turning rest

FOR A GOOD TURN FASTER . . . TURN TO MONARCH

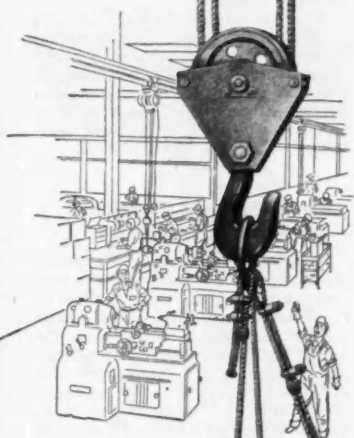
Monarch

TURNING MACHINES



THE MONARCH MACHINE TOOL CO., Sidney, Ohio
Gentlemen:
Please send me without obligation your Booklet No. 1003 covering the Monarch Precision Manufacturing Lathe—Model EE. (It's that new one with 28 pages and a host of those sparkling Monarch illustrations.)

NAME _____
COMPANY _____ TITLE _____
ADDRESS _____
CITY _____ ZONE _____ STATE _____



NUCLEUS OF "Sound" RESEARCH



Magnecorder

**Finest for Industry—
Finest for Your Home!**

The high fidelity Magnecorder lets you hear great music and history-making broadcasts as they should be heard—with all the true brilliance of "living sound." The First Choice of Radio Engineers Everywhere!

**Professional Tape Recording Equipment
for Every Industrial Need**

**NOISE ANALYSIS • PROCESS CONTROL
VIBRATION TESTS • TELEMETERING**

For complete information, write MAGNECORD, Inc.
Dept. IB-9, 360 N. Michigan Ave., Chicago 1, Ill.

HOLLEY DISCOVERS HOW TO SPARK A CARBURETOR IMPROVEMENT WITH



ACE
PRECISION
NYLON BALLS

Holley Carburetor Co., Detroit, uses Ace Nylon Balls as check valves in carburetors to permit a higher degree of spark advance.



For the first time . . . DuPont Nylon FM #10001 balls mass-produced to close tolerances. The result . . . toughness at low temperatures, form stability at high temperatures, light weight, chemical and abrasion resistance.

Hundreds of Industrial Applications!
Let our engineers advise you.

Request samples and bulletin TODAY

ACE PLASTIC COMPANY

Precision Plastic Fabricators and Extruders

91-46 VAN WYCK BLVD. • JAMAICA 2, N. Y.



**SIZES 1/8" — 3/4"
TOLERANCES ± .001**

Industry News

(Continued from page 156)

about \$12.5 million. The unit price could be lowered to an estimated \$3.8 million if 100 such aircraft were ordered, the Air Force said.

Operating mechanisms within the plane are very expensive, legislators were told, and installation requires a great deal of hand labor. The cost of bombing apparatus for the B-52, according to one Air Force general, "will get down to about \$250,000 apiece" when additional units are ordered. The K-1 bombing system, as described by Brig. Gen. Horace A. Shepard, is "a combination radar and optical system that involves a roomful of black boxes, each of which in itself is a very expensive item. It involves radar; it involves a computer; it involves a bombsight, both an electronic bombsight and an optical bombsight. . . ."

In addition to its projected use with the B-52, the K-1 system is built for the B-36—now the Air Force's top long-range bomber—and the B-47, Boeing's high-speed plane for work at shorter ranges. Factories at Tulsa and Marietta, Ga., are scheduled to begin delivering B-47s in the spring of 1953.

Trico Products Completing Five Year Expansion

Trico Products Corp., Buffalo, N. Y., is completing a five-year expansion program that has added over 1 million sq ft of factory space. Additional plants acquired and extensions built since the end of World War II have been pressed into service to meet requirements for windshield wiper and washer products. The latest extension of 288,000 sq ft will bring Trico's total manufacturing area to 1.6 million sq ft.

R. C. Mahon Moves Last Two Divisions to New Plant

The Structural Steel Div. and the Steel Deck Div. of the R. C. Mahon Co. have now completed movement to the company's new plant in Detroit. This move brings the entire Mahon operation, including general offices, into one location where the eight divisions of the company will occupy a plant covering some 57 acres when construction is completed.

ASTE'S First Conference in South Central Area

Plans for the first south central area conference of the American Society of Tool Engineers, Oct. 19-20, have been announced. The meeting, sponsored by 12 ASTE chapters in a 250 mile radius in southwestern Ohio, Indiana, Illinois,

EATON

Zero-Lash

HYDRAULIC VALVE LIFTERS

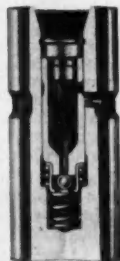
—automatically maintain
zero clearance in the
valve train at all times



Zero-Lash opens the door to:

- Cam design improvement for optimum engine operating efficiency.
- Freedom from loss of efficiency from varnish and sludge.
- Perfect tappet adjustment for the life of the engine under all engine operating speeds and temperatures.
- Longer and better service for valves and seats.
- Silent valve train operation.
- Smoother idling.

Eaton engineers welcome the opportunity to discuss application of its multiplicity of hydraulic valve lifter designs to engines proposed or now in design.



EATON MANUFACTURING COMPANY

CLEVELAND, OHIO

SAGINAW DIVISION: 9771 FRENCH ROAD • DETROIT 13, MICHIGAN



PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings • Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

This DISASTER was born 18 months before it happened!



A year and a half before the axle snapped to cause this disastrous pile-up, a minute crack started. The axle looked all right during overhaul. It passed the eagle eyes of the inspectors. But this tiny, invisible crack grew larger and deeper in the thousands of miles—and 18 months of service. Finally—the axle gave way entirely, in a typical, progressive, fatigue failure.

Magnaflux would have prevented this, and does for hundreds of railroad, bus, truck, and airline operators. Magnaflux finds such defects in a wide variety of materials during manufacture and overhaul. It makes invisible cracks visible. Magnaflux is low in cost, non-destructive—and so fast that it performs at production line speeds!

For detailed information of how Magnaflux saves money and lives, write for literature, sent on request without obligation.

MAGNAFLUX



MAGNAFLUX CORPORATION
5904 Northwest Hwy., Chicago 31, Ill.
New York • Dallas • Detroit • Cleveland • Los Angeles

Industry News

(Continued from page 158)

Kentucky, Tennessee and Missouri, will be held in Evansville, Ind. Included in the two day program are three technical sessions, one of which is in the nature of a general panel discussion of major problems confronting tool engineers today. Also on the program is a discussion of recent developments in carbide tools and dies by J. S. Gillespie, Carbide Dept. of the General Electric Co. and a session to be devoted to other tools and methods for defense production.

Int'l Nickel Develops Corrosion Effect Data

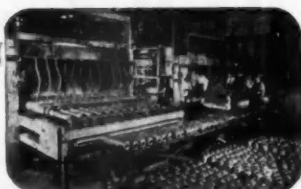
A quantity of information on the corrosive effects of various hot environments has been accumulated by the Development and Research Div. of the International Nickel Co., Inc. This has involved a continuing and expanding program designed to evaluate the corrosion resistance at high temperature of different metals and alloys for such specific applications as are encountered in the aviation, petroleum, chemical processing, heat treating, and other fields, especially those producing equipment and supplies for the defense program.

Testing Society to Hold Meeting in Detroit

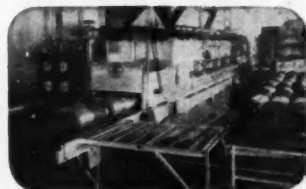
One of the four technical societies which sponsor the National Metals Congress to be held in Detroit, Mich., during the week of Oct. 15-19, is the Society for Non-Destructive Testing, Inc., which will hold its eleventh annual meeting, in Detroit, Oct. 15-18. Eight technical sessions will be presented with emphasis on: one, the application of non-destructive testing to the defense production program, and, two, the latest scientific developments in the four major types of non-destructive testing, radiography, magnetic testing, ultrasonics, and penetrant testing.

Four Munitions Board Agencies Brought Under One Head


The four standardization agencies of the Munitions Board have been brought under one head for the purpose of coordinating their activities. The new director is William Harrigan, former official of the Texas Co., who assisted the government in the design of incendiary bombs while with the Office of Scientific Research and Development. He is an industrial engineer and a member of the ASME and SAE, among other engineering societies. In his new job he will coordinate and direct the work of the board's Standards agency, Inspection agency, Cataloging agency, and its Packaging agency.



Shell Forgings 25 mm, 40 mm, 105 mm and other sizes are water-line hardened, uniformly, automatically and continuously, in these and other EF gas fired installations.



Gas Cylinders Compressed gas cylinders or tanks are continuously normalized and annealed, water-line, inside and out—in this and other EF gas fired furnaces.

Typical  Furnace
Installations
for

Defense Production

We have the drawings and have already built these and many other defense production furnaces. Years of experience and complete manufacturing facilities enable us to give dependable service on furnaces for treating jet or propeller type engine parts; tank, automotive or aircraft parts; armor plate; metal powder products, ammunition components and other defense products.

Ask for
Bulletin
461-DP

THE ELECTRIC FURNACE CO. • SALEM, OHIO
GAS, OIL OR ELECTRIC FURNACES, FOR ANY PRODUCT, PROCESS OR PRODUCTION



Aircraft Parts Propeller blades are uniformly heated and quenched in this EF continuous furnace. Types available for other propeller and jet type engine and aircraft parts.



Shell Cases A battery of EF gas fired radiant tube continuous annealing furnaces. Other types available for steel or brass.

Since 1887

MILWAUKEE
WROT WASHERS

Better
WASHERS
... Competitively Priced

Large volume production, the most advanced methods and facilities, plus more than 60 years of continuous experience in the manufacture of Washers, are factors that enable us to offer you top quality washers and stampings at competitive costs. Over 22,000 sets of dies for making Washers of every type (Standard and Special), from every type of material, for every purpose, in any finish. STAMPINGS of all descriptions; Blanking, Forming, Drawing. Submit your blueprints and quantity requirements for estimates.

**WROUGHT WASHER
MANUFACTURING CO.**

The World's Largest Producer of Washers

2212 S. BAY ST., MILWAUKEE 7, WIS.



**THIS "triple-threat" PUMP
WILL HELP YOU KEEP
PRODUCTION ON SCHEDULE**

Specify TUTHILL MODEL L

- For Pressure Lubrication
- For Hydraulic Controls
- For Liquid Transfer

If you need dependable pumps for these important services in your plant, get the facts on Tuthill Model L.

This positive displacement internal-gear rotary pump is known the world over for its dependability—its mechanically-sealed, leak-free performance; quiet operation; low power consumption, and long life.

Capacities to 3 g.p.m. and pressures up to 400 p.s.i. Write for Tuthill Model L bulletin.



TUTHILL PUMP COMPANY
930 East 98th Street, Chicago 19, Ill.

**B
U
Y

B
O
N
D
S**

THE MACHINERY INDUSTRY

(Continued from page 50)

Whatever the case may be, the builders are at least thinking along the lines of preventing the hard times of 1947 and 1948 from recurring to the machine tool industry.

125th Anniversary

The Heald Machine Co., Worcester, Mass., celebrated its 125th anniversary by holding an open house celebration at the plant. A variety of machines were displayed from a cheese press, circa 1845, to a modern internal grinding machine. An interesting fact concerning this anniversary is that the company has been owned and operated by the same family since its start.

Pneumatic Tools

In Washington, the industry committee on portable pneumatic tools of the NPA stated that the CMP was working out very well for their industry. Buying small quantities of special steels is the only difficulty they have experienced, according to industry spokesmen. With the industry in general working on a two-shift basis, its backlog of orders is from three to six months' production.

European Aid Decrease

Purchase approvals issued for machinery and equipment to 17 Western European countries under the Marshall Plan totaled \$121,700,000 during the fiscal year ending in 1951. This represents a drop of nearly 82 per cent from the 1950 fiscal year total of \$670,200,000.

Film Templet for Plant Layout

"Visual" Planning Equipment Co., Inc., Oakmont, Pa., is offering the Re-pro-Templet system. This is a complete method for securing blueprints or Ozalid prints directly from "Visual's" three-dimensional layouts.

A photographic film templet, coated with a pressure-sensitive cement, is now furnished to match each piece in the model layout. Once the layout is complete, the "Visual" Photo-Repro-Temples, affixed to a film grid sheet, become the master from which as many prints as needed may be secured.

AUTOMOTIVE INDUSTRIES
Keeps You Informed



"Wonder how many there'll be in 1960?"

You guess! 50 Million? 60 Million? Whatever the number, they will surely be *better* cars . . . safer, more comfortable, and more efficient.

And what will make them better? Among other important factors, improved *castings*. Even now, cast camshafts, cylinder blocks and heads, pistons and other automotive castings are being designed for the engines

of the future. These castings will be of advanced design, with greater strength and wear resistance and better machinability. These castings are being developed *now* by the largest independent contracting foundry in the world . . . Campbell, Wyant and Cannon . . . where advanced metallurgical engineering, precision control, and mechanized production assure the highest quality castings at lowest cost.

CAMPBELL, WYANT AND CANNON FOUNDRY COMPANY, MUSKOGON, MICHIGAN
Foundries in Muskegon, South Haven and Lansing, Michigan

. . . serving the automotive, farm equipment, railroad and marine industries and the Armed Forces.



CAST CYLINDER HEADS AND BLOCKS



CAST PISTONS



CAST CAMSHAFTS



CAST CRANKSHAFTS



CAST GEARS



CENTRIFUGALLY CAST CYLINDER LINERS



CENTRIFUSE BRAKE DRUMS

CWC

Since 1909

MICHIGAN STATE FAIR GROUNDS

★
DETROIT

Metal Yardstick- **3 MILESTONES LONG...**

Milestones of metal progress . . . of metal research . . . of world-wide metal conservation and utilization . . . these are the brilliant features of the National Metal Exposition of '51 . . . features that will lend a strong lure to the nation's newest and finest achievements in the metal industry. Ask yourself where else on earth you could find concentrated in one place the best brains and the best products of a free world's finest and most basic industry. Be there!

Detroit, Mich.—Oct. 15-19

★
**NATIONAL METAL
EXPOSITION**

★
**NATIONAL METAL
CONGRESS**

★
**WORLD
METALLURGICAL
CONGRESS**

**Your broaching
question needs
Three right
answers**

the
American
way gives
you all
three

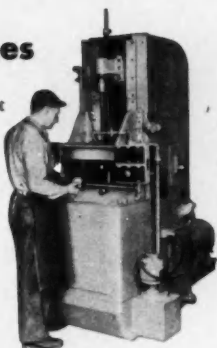
1 The RIGHT Tools

Your first right answer from American is the precision quality in every American-engineered broach. American engineers and skilled workers have over thirty years of "Know-How" in design and manufacture, which assures you of the right broach for the job.



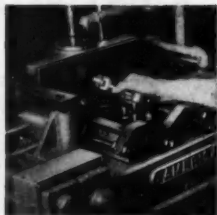
2 The RIGHT Machines

The next right answer is the machine most capable of performing your job. To select the correct machine, American engineers can choose from more than 35 standard internal and surface type machines. If yours is a special or unusual job, they can design and build a special machine to fit the operation.



3 The RIGHT Fixtures

A highly important answer to broaching accuracy is the work holding fixture. Whether a simple manually operated one — or a complex fixture with automatic clamping and ejection, American fixtures are engineered for fast, accurate and economical production.



Write for the recommendations of the company that builds all three, broaches, broaching fixtures, and broaching machines, for the right answers to your broaching question. Send a part-print or sample and hourly requirements. No obligation, of course. Address Dept. I.

... and speaking of threes

Ask about the American 3-Way broaching machine ... the machine that's easily adapted to push, pull, or surface broaching. Write for Circular No. 100.



American BROACH & MACHINE CO.
A DIVISION OF SUNSTRAND MACHINE TOOL CO.
ANN ARBOR, MICHIGAN



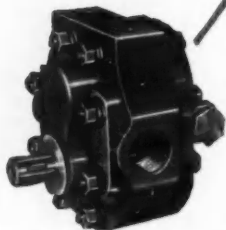
See *American* First — for the Best in Broaching Tools, Broaching Machines, Special Machinery

Another Job for *Pesco* HYDRAULIC MUSCLES

BW



A TINY PESCO MOTOR POSITIONS HEAVY GRADER BLADE FOR 100 h.p. THRUST



This is the Pesco motor on the Warco Grader. It has a displacement of 6.1 cu. in. and 85 lb. torque per 100 psi at 1000 psi operating pressure.

The Warco Grader is a tough, rugged machine, built for the roughest kind of hard work. Every part takes a severe beating on every job . . . including the Pesco hydraulic circle turn motor.

This small motor—it weighs only 20.8 pounds—revolves the heavy grader blade to the *exact position required*. Then the 100 h. p. engine of the grader thrusts the entire machine forward while the blade takes a cut.

It's the kind of a job that demands the highest type of precision manufacture and quality of materials in the hydraulic motor. Leakage and failure cannot be tolerated. That's why the W. A. Riddell Corporation, manufacturers of the Warco Grader, selected Pesco motors for this tough assignment.

The same skills and precision go into every Pesco product. It is your guarantee that your product will perform in a way that will build a loyal client following for you when you add the sales power of Pesco hydraulic power to your product. Call Pesco today.



BORG-WARNER CORPORATION
24700 NORTH MILES ROAD BEDFORD, OHIO

208 OPERATIONS IN 44.3 SECONDS

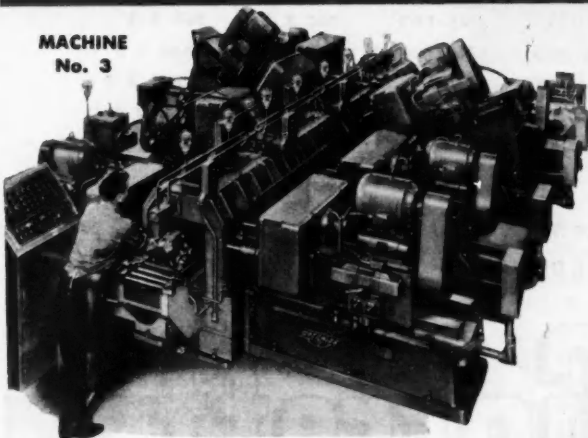
These recently-built Greenlee transfer machines mill, bore, drill, ream, and tap transmission cases for a well-known automobile. A total of 183 tools complete 208 operations in an automatic cycle time of 44.3 seconds. Features include face and end-milling heads, turnover and chip-cleanout stations, and indicator lights for tool changing. Self-contained hydraulic units conform to JIC standards for easy maintenance. These outstanding machines are among the newest built by Greenlee—a pioneer in progressive transfer-machine principles.



MACHINE No. 4

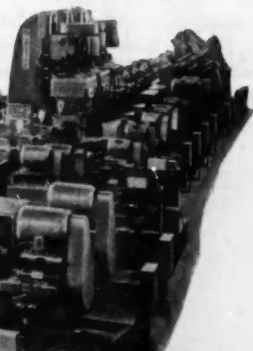
GREENLEE

MACHINE
No. 3

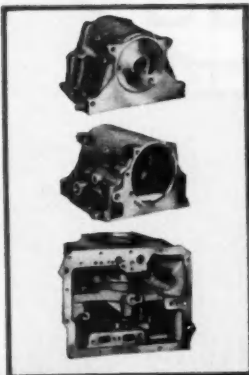
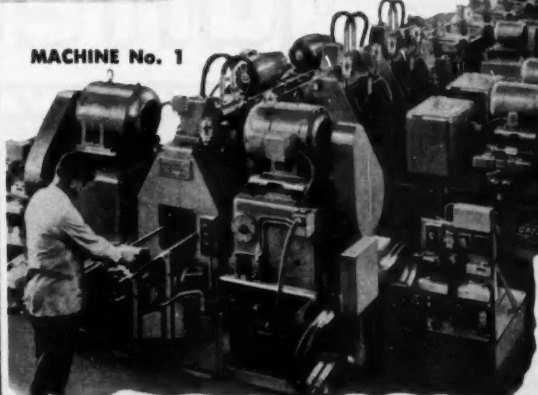


TRANSFER MACHINES
PROCESS
AUTOMATIC
TRANSMISSION CASES
AT THE PRODUCTION RATE OF
65 CASES PER HOUR

MACHINE
No. 2



MACHINE No. 1



GREENLEE

GREENLEE BROS. & CO.
1739 MASON AVENUE
ROCKFORD, ILLINOIS

MULTIPLE SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES

WASHERS

FLAT AND LOCK WASHERS TO MEET ARMED FORCES SPECIFICATIONS

Let Garrett fill your contract needs for all types of washers. We manufacture a complete line of high quality washers to meet the most exacting specifications of the Army, Navy and Air Force. Whether in regular steel, stainless steel, spring steel, brass, bronze, monel metal, aluminum, Alclad, copper or other metals specified we can supply them all. Our modern plating facilities offer you washers plated with zinc, cadmium, nickel, brass, chrome . . . or parkerized. Get what you want when you want them. Order washers from Garrett. Here are a few of the many product-proved washers in the line:

AN 935	AN 961	NAS 143	BEC X 3.1	BEB X 2
AN 940	AN 970	NAS 143C	BEC X 4	BEB X 3
AN 945	AN 975	BEC X 1	BEE X 1	BEB X 8
AN 950	AN 8013	BEC X 2	BEB X 1	BEB X 1
AN 955	NAS 70	BEC X 3	BEB X 1.1	SC 104-1
AN 960	AN 122576 thru 122600			

WRITE FOR NEW FOLDER OF SPECIFICATIONS FOR ARMED FORCES WASHERS
GARRETT OF ELLWOOD CITY • GARRETT OF PHILADELPHIA



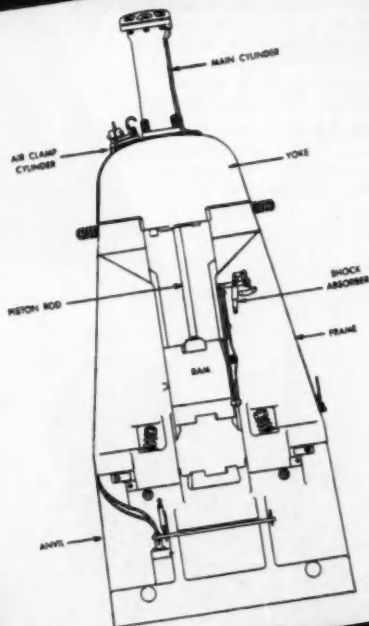
Garrett

OF PENNSYLVANIA



GEORGE K. GARRETT COMPANY, INC. • PHILADELPHIA 34, PA.

MANUFACTURERS OF
STAMPINGS • LOCK WASHERS • FLAT WASHERS • SPRINGS • NOSE CLAMPS



**MANY FORGINGS CAN BE MADE
FASTER, CHEAPER, MORE ACCURATELY
ON THE CECO-DROP**

The rapid striking action of the Ceco-Drop, the quick get-away of the ram after striking and the low center of gravity, insuring accuracy of die match, are a few of the reasons why forgings like these have shown increased production, more uniform accuracy and lower costs when transferred from other gravity drop hammers to Ceco-Drops. Write for Bulletin 11-L-6

CECO-DROP

• *The Boardless Gravity Drop Hammer* •
CHAMBERSBURG ENGINEERING CO., CHAMBERSBURG, PA.

Morse means Timing Chains

IN THIRTY-SEVEN YEARS of close collaboration with the automotive industry, Morse has produced 54,000,000 timing chains. Each one of the 54,000,000 has borne eloquent testimony to Morse's reputation as the leading manufacturer of automotive timing chains.

MORSE CHAIN COMPANY

Head Office: 7601 Central Ave., • Detroit 8, Michigan

This portable volcano of the 1880's resembles its modern, automotive offspring no more closely than its cumbersome system of belts, pulleys, and gears resembles today's accurate, smooth-running Morse Chain Drives.

This is one of a series of old prints of old machines (and ways of power transmission) that will appear in Morse advertisements. Write for your free, enlarged copy, suitable for framing for your collection.



MORSE

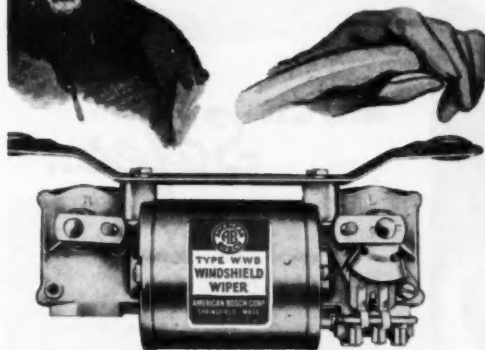
MECHANICAL
POWER TRANSMISSION
PRODUCTS



*Put these TWIN ARCS of CONSTANT VISION
between drivers and TROUBLE!*



AMERICAN BOSCH DIRECT ELECTRIC DRIVE DUAL WINDSHIELD WIPERS



- ▶ Direct, electric drive with constant action regardless of engine load or speed.
- ▶ Synchronized, two speed operation of Dual arms and blades. Tandem or opposed wiping motion.
- ▶ Fully automatic blade parking, adjustable to suit installation. Arms up to 12" long. Blades up to 14". Wiping angle up to 118°.
- ▶ Bad weather power—30 inch/lbs. torque per blade. Thermal cutoff protects wiper motor against overload.
- ▶ Available for 6, 12 or 24 volt systems. For cars, trucks and tractors.

When the weather turns bad, that's when Car and Truck owners need constant, good vision on the road. You can put them on the clear route to safety with American Bosch DIRECT ELECTRIC DRIVE Windshield Wipers. Regardless of engine speed, load or acceleration, they *always* function with unfaltering, synchronized action, because they operate independently of the engine. There's no lag or stuttering of the wiper blades, even in the roughest weather.

Ask about Model WWB—designed for swift, simplified dual installation under cowl on cars and trucks. Rugged, heavy duty American Bosch construction guarantees years of trouble-free service. Already in wide use as original equipment, these Dual Electric Wipers offer a keen, sales-active feature for your Line. Ask for complete specifications.

*Also Available—the famous WWA Single
Electric Wiper for Truck, Bus, and
Marine service.*



American Bosch

MAGNETOS • GENERATORS • VOLTAGE REGULATORS • IGNITION COILS
ELECTRIC WINDSHIELD WIPERS • DIESEL FUEL INJECTION EQUIPMENT

AMERICAN BOSCH CORPORATION • SPRINGFIELD 7 • MASS.

MIDLAND VACUUM POWER BRAKES



MORE

Control..

SAFE BRAKING AT ALL GRADES

Among the most trying road conditions are dangerously steep grades with hair-pin turns. On such roads—and under all other conditions—Midland Vacuum Power Brakes are a dependable safeguard for truck and load.

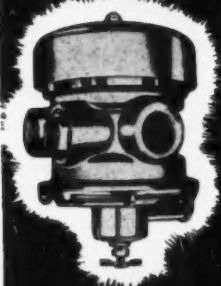
Your assurance that Midland equipment is best for your trucks and trailers lies in the fact that Midland Brakes have been proved in millions of miles of service.



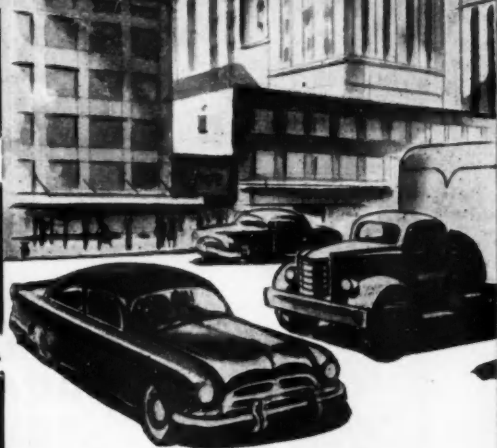
MIDLAND
VACUUM
HY-POWER



VACUUM
HAND CONTROL
VALVE



VACUUM
RELAY VALVE



MUCH

Safer..

STOPS ANY LOAD SAFELY and QUICKLY

When an emergency arises, Midland Vacuum Power Brakes bring even the biggest and heaviest trucks to a smooth stop almost instantly.

Midland Vacuum Hy-Power brakes with new Hand Control Valve and New Relay Valve offer the ultimate in brake equipment—and dependable safety insurance.

Get the facts from a Midland Distributor near you, or write or phone us in Detroit.



Those who know
POWER BRAKES
Choose **MIDLAND**

The
MIDLAND
STEEL PRODUCTS COMPANY

6660 Mt. Elliott Ave.

Detroit 11, Mich.

Export Department: 28 Pearl Street, New York, N. Y.



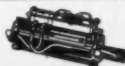
Air and Vacuum
POWER BRAKES



World's Largest Manufacturer of
AUTOMOBILE and TRUCK FRAMES



Air and
Electro-Pneumatic
DOOR CONTROLS



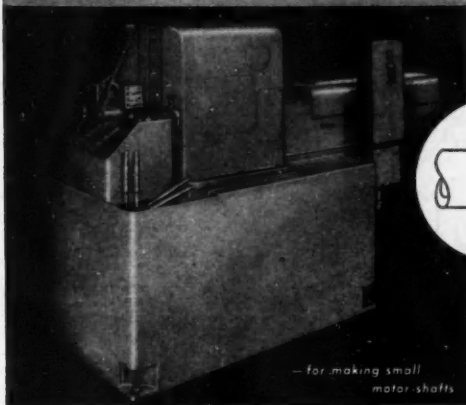
MOTCH & MERRYWEATHER

Cam Automatics-

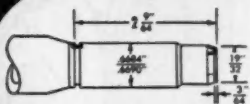
HOPPER LOADING OR BAR FEED

• **COMPLETELY AUTOMATIC** •

**TWO SPINDLES CONTROLLED
BY ONE MAIN CAMSHAFT**



— for making small
motor shafts

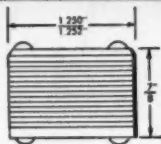


MOTOR SHAFTS

Operation: Turn, neck and chamfer.

Material: Steel tubing.

Production: 1400 pcs/hr. @ 100% efficiency.

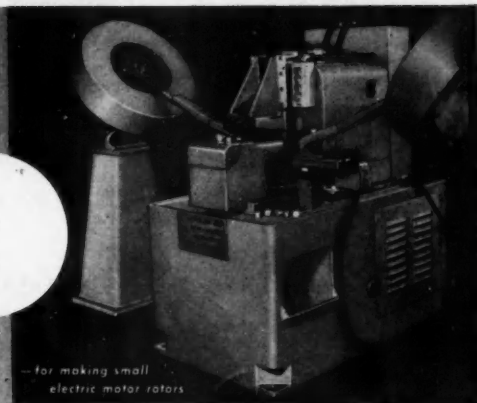


SMALL MOTOR ROTORS

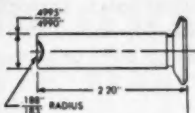
Operation: Turn O. D. and chamfer one end.

Material: Laminated silicon steel.

Production: 800 pcs/hr. @ 100% eff.



— for making small
electric motor rotors

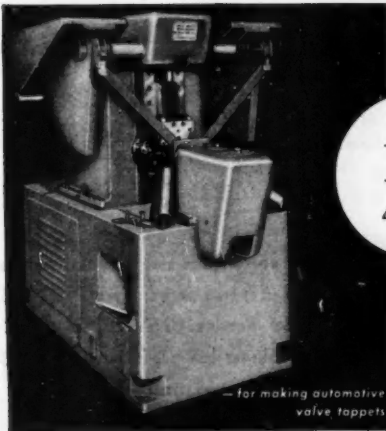


VALVE TAPPETS

Operation: Radius, neck and chamfer.

Material: 5120 steel.

Production: 2400 pcs/hr. @ 100% efficiency.



— for making automotive
valve tappets

Stock feed, loading and locating mechanisms, collets and feeds of tool slides are controlled mechanically by a single camshaft — *simplicity itself*. M. & M. cam automatics require minimum attention and only occasional checking of work-pieces. If you will submit your drawings and specifications, we will tell you how Motch & Merryweather cam automatics can increase your production with accuracy.

Manufactured by

THE MOTCH & MERRYWEATHER MACHINERY COMPANY
715 PENTON BUILDING • CLEVELAND 13, OHIO

Builders of Circular Sawing Equipment, Production Milling, Automatic and Special Machines

PRODUCTION-WITH-ACCURACY MACHINES AND EQUIPMENT



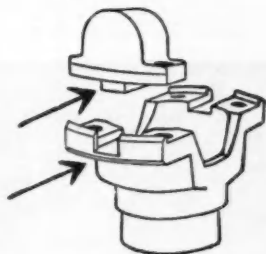
if
SAFETY
 is
 your
 problem



M ECHANICS Roller Bearing UN:VERSAL JOINTS increase the Safety factor in power transmission lines, because heavy, machined KEYS and corresponding keyways, not bolts nor screws, transmit the torque.

The only function of the cap screws is to hold the bearing assemblies in place.

This KEY method of driving has the highest safety factor, transmits the most torque with the least weight, and avoids costly breakdowns resulting from driving through bolts or screws that work loose.



MECHANICS
Roller Bearing
**UNIVERSAL
 JOINTS**

For Cars, Trucks, Tractors, Farm Implements,
 Road Machinery, Industrial Equipment, Aircraft

Let our engineers show you how this and several other MECHANICS Roller Bearing UNIVERSAL JOINT advantages will benefit your new and improved products.

**MECHANICS
 UNIVERSAL JOINT
 DIVISION**

Borg-Warner

2024 Harrison Ave., Rockford, Ill.



Send for these...

ENGINEERING BULLETINS on SLEEVE BEARING DEVELOPMENTS!



**YOUR BUSINESS LETTERHEAD
REQUEST** brings all back issues while
still available — but write now!

Here's a quick, convenient way for the designer, engineer and draftsman to keep up-to-date on developments in materials, design and applications of sleeve bearings, bushings and similar precision parts. The latest news on improved cast and sintered copper-leads . . . the new bi-metal rolled, split-type bearings . . . the re-design problems involved when shortages call for bearing lining changes . . .

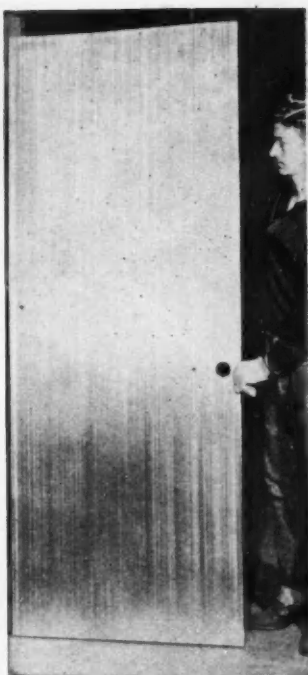
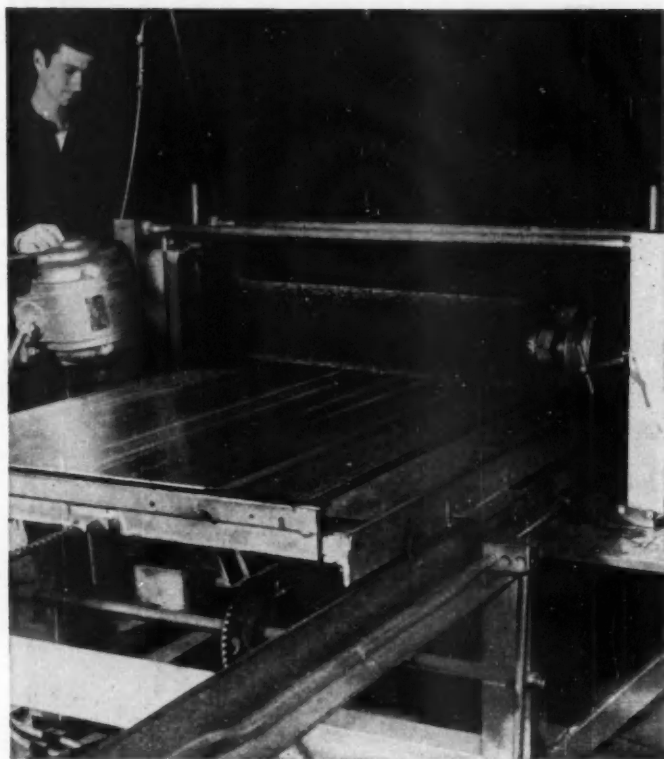
"Sleeve Bearing Topics" will help keep you abreast of all of these developments. A request on your business letterhead places your name on the list. Right now we can also send you back issues to make your file complete. Fits standard files, punched for a 3-ring binder. Address your request to:

FEDERAL-MOGUL CORPORATION
11037 SHOEMAKER • DETROIT 13, MICH.



Since 1899

Our six plants produce sleeve bearings in all designs and sizes; cast bronze bushings; rolled split-type bushings; bi-metallic rolled bushings; washers; spacer tubes; precision bronze parts and bronze bars.



THE ALUMINUM DOOR

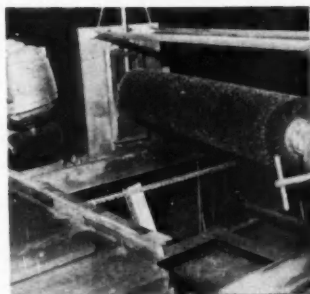
Osborn wire wheel brushes have removed the blemishes and prepared the surface for lacquering.

What takes off the coat and helps the salesmen?

...*A brush!* Here's a door-way to better aluminum products:

The product is an aluminum door. It was impractical to make lacquer adhere uniformly to the aluminum. With the help of the **Osborn Brushing Analyst**, a machine using Osborn wire brushes was built to prepare the surface for lacquering. Result: lacquer sticks perfectly to the brushed surface, giving an attractive, durable finish that helps sales.

The **Osborn Brushing Analyst** is opening the door to lower costs and better products of every description. Have him survey your operations, including cleaning and finishing. Call or write *The Osborn Manufacturing Company, Dept. 531, 5401 Hamilton Avenue, Cleveland 14, Ohio.*



THE BRUSHING MACHINE

Door is mounted on a conveying table which travels under Osborn brushes mounted as shown. Brush at left brushes side of door. After traveling one way, door is turned over and table reverses.



LOOK FOR THE NAME OSBORN . . . RECOGNIZED EVERYWHERE FOR
QUALITY WORKMANSHIP AND MATERIALS

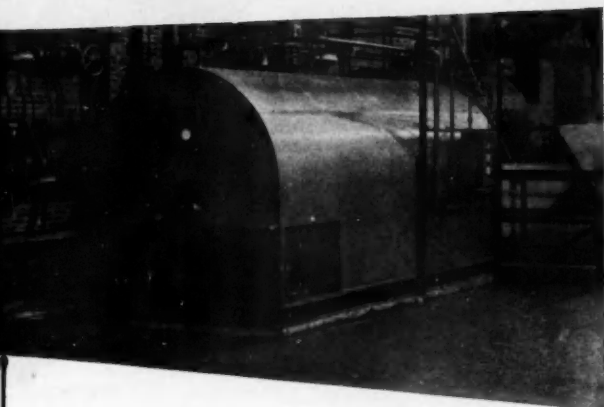
YOU TOO

can have a simple brushing machine to help you produce better, more salable products. Let Osborn show you how.

CARDOX — Originator

of LOW PRESSURE Carbon Dioxide
FIRE EXTINGUISHING SYSTEMS*

Offers You Experience
Gained Through
Thousands of
Successful
Installations



APPROVED BY:

Underwriters' Laboratories, Inc.

Manual Systems—1940

Automatic Systems—1941

Factory Mutual Laboratories

Manual Systems—1942

Automatic Systems—1942

First Installation—1939

CHOSEN BY:

The "Who's Who" of
American Industry

38 of the nation's 50
leading corporations

14 of the nation's 25
largest utilities

Hundreds of other plants
in scores of fields

Researched — Pioneered — Perfected — and Patented* by CARDOX

When you are considering a fire extinguishing system you want *facts*, not *claims*—protection based upon *experience*, not *experiment*. In low pressure CO₂ systems, that means CARDOX—and *only* CARDOX.

CARDOX originated and created low pressure CO₂ fire extinguishing systems. Millions of dollars spent by CARDOX in research... decades of experience and progress telescoped into a dozen years by war and top priority projects—have given CARDOX a supremacy in technical and engineering knowledge that is unduplicated.

Thousands of CARDOX Systems protecting the "hot spots" of industry—for which only CARDOX Systems were adequate—have saved untold millions in stopping fire and production losses.

On the face of it, there is no "equivalent" to CARDOX. When hazards are tough—and call for protection by low pressure CO₂—they call for CARDOX.

Tell us when we can help you!

* Covered by CARDOX Patents, issued and pending.

CARDOX CORPORATION

BELL BUILDING • CHICAGO 1, ILLINOIS • Offices in Principal Cities

Here's Le Roi's sensational *Advanced Design* engine

the new
200HP
H540

V8



... the most modern power plant
available for heavy-duty trucks

Ask for this engine when you buy your new heavy-duty truck. You get 200 hp from a smooth-running, high compression V-8 engine — a sensationally new engine that gives you greater economy and longer life. Just look at these features:

- ★ Modern V-8, high-compression, valve-in-head design!
- ★ 207 horsepower — speed range, 800 to 3200 RPM
- ★ Lowest weight to horsepower ratio in the industry — only 6 lbs. per HP! You carry bigger payloads.
- ★ Most compact engine in its horsepower range — overall length only 43"!
- ★ Faster acceleration — quick response results from short stroke, light flywheel, and 8-cylinder power impulses!
- ★ Good high-speed performance — large bore and short stroke provide ample valve area. Unique combustion

chamber shape having ample quench area retards detonation!

- ★ Smoother running engine at all speeds — extra rigidity of short box-like crankcase and five large main bearings reduce vibration!
- ★ Long life — replaceable, wet cylinder sleeves wear well, are inexpensive to replace. Stellite valves and seats and positive-type rotators promote long valve life — chrome-plated top ring adds extra miles between overhaul.

So, for better performance and lower operating costs, be sure your new heavy-duty trucks are powered with a Le Roi H-540. The coupon below will bring you a new H-540 catalog and specification sheet. Send for them today.

Tear out this coupon and mail TODAY!

LE ROI COMPANY, Dept. E-718

1706 S. 69th Street, Milwaukee 14, Wisconsin

Please send me complete information on the "advanced design" features of your new H-540 engine for heavy-duty trucks.

Name _____ Position _____

Company _____

Company Address _____

City _____ State _____

Condensed H-540 Specifications

Number of cylinders	- - - - -	8
Bore and stroke, inches	- - - - -	4 1/2 x 4 1/4
Displacement, cubic inches	- - - - -	540
Horsepower, rated at rpm	- - - - -	207/3000
Weight bare, lbs.	- - - - -	1250

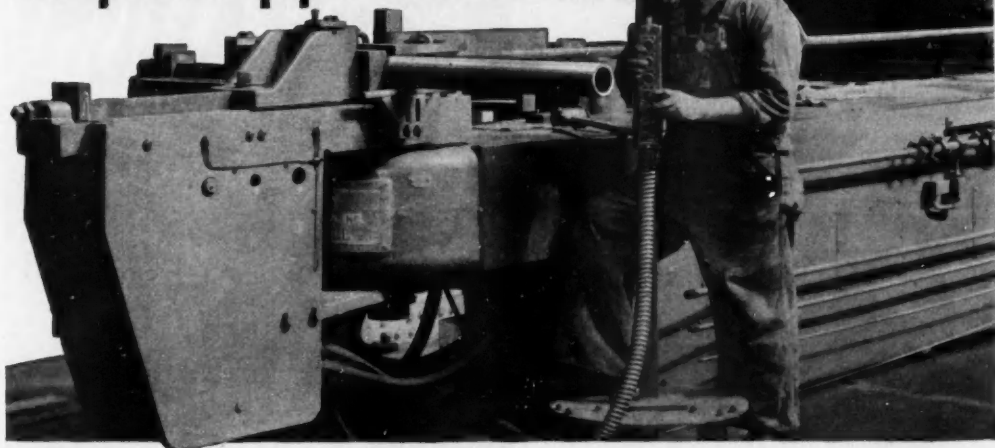
LE ROI COMPANY

MILWAUKEE 14, WISCONSIN

Plants: Milwaukee • Cleveland • Greenwich, Ohio

E-71

How ALLIS-CHALMERS simplifies pipe fabrication



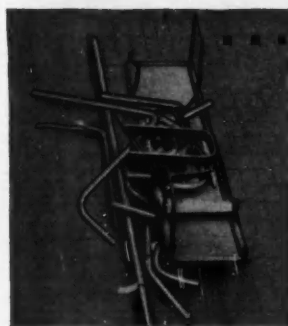
with a PINES AUTOMATIC BENDER

Cold Bending Eliminates Costly Pickling Operation

In a centralized pipe fabricating division at the Allis-Chalmers West Allis Works, a wide range of cold bending jobs for production and maintenance needs are now efficiently handled on this Pines Hydraulic Automatic Bender. The machine has ample capacity for handling requirements for pipe and tubing ranging in sizes from 3/4" thru 5". The cold bending principle of the machine, combined with push-button control and automatic operation, reduces manual effort, and cuts costs. *For example*, in place of hot bending, long lengths of 3" oil line piping are now cold formed at speeds five times more efficient. In addition, a costly cleaning and pickling operation is avoided.

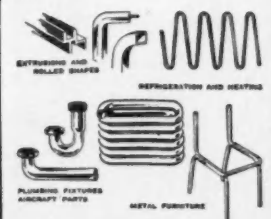
Small Lots Handled Profitably—Low Tooling Expense

Further, most small lot jobs are handled profitably. The centralized operation permits standardizing on radii of bends which lowers tooling expense. Simplicity of tooling and quick change-over features of the machine saves set-up time. The capacity and versatility of the equipment also permits handling all types of materials and shapes suitable to cold bending, such as stainless steel and chrome-moly tubing, extra heavy wall piping, channel iron, extruded and structural shapes. Thus, with modernized equipment and skillful engineering, fabricating and assembly work at A-C are greatly simplified.



View of small lot bending jobs performed on Pines Size 4 Automatic Bender. Smooth, accurate bends are formed without wrinkles or distortion.

OTHER TYPICAL PINES BENDING JOBS
There's a complete range of Pines Benders designed to profitably handle jobs like these.



PINES
ENGINEERING CO., INC.

Write FOR MORE FACTS TODAY

Find out how Pines Benders may be tooled for your work. Free catalog shows various models and tooling applications on actual jobs.



Specialists in Tube Fabricating Machinery

653 WALNUT • AURORA, ILLINOIS

BENDING • DEBURRING • CHAMFERING • THREADING • CUT-OFF MACHINERY

Since 1932 . . .

more than 60,000,000 K. S. Electric Telegages (water temperature, fuel level and oil pressure) have been produced for the keenly competitive, highly critical automotive market.

To maintain this leadership and progressively improve these instruments King-Seeley carries on a consistent program of engineering research and development. Among these improvements is the design change which enables the Telegage to withstand continuous vibration in two planes for eight hours at vibration rates ranging from 0 to 4,000 per minute.

Another is the introduction of spun glass insulation for heater wires to protect the circuit against damage from current surges and shorts.

Still another is compensation for voltage variation. Such variation may range from 5 to 9 volts without interfering with the accurate performance of the Telegage.

For the last five years King-Seeley has operated under a carefully organized Quality Control System which has materially improved the standards of workmanship and the uniformity of Telegages.

Besides the conventional inspections all tank unit diaphragm stock is tested to 1,000,000 cycles and stock for oil pressure diaphragms to 10,000,000 cycles. All stock has to pass these tests to be accepted.

As Research discovers better designs, better manufacturing methods and better materials, these also will be incorporated in the K. S. Telegage.

KING-SEELEY

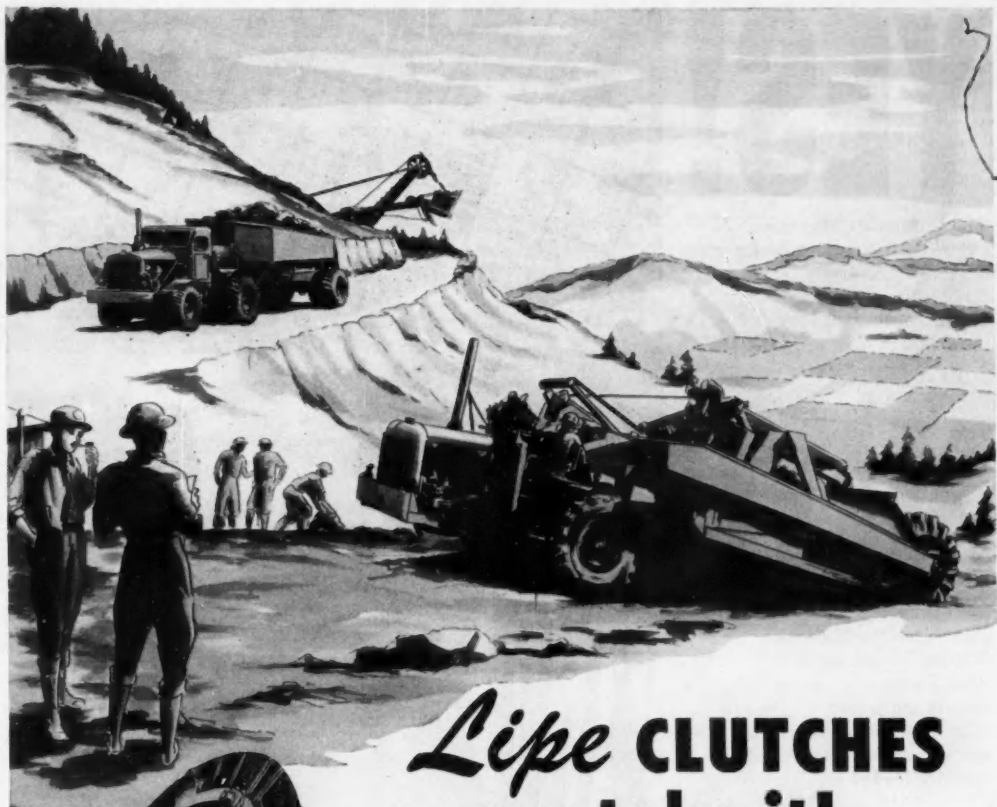
CORPORATION

ANN ARBOR, MICHIGAN

PLANTS AT ANN ARBOR, SCIO, AND YPSILANTI

INFORMATION
FOR THOSE WHO
Specify
DASHBOARD
INSTRUMENTS





Lipe CLUTCHES can take it!



Your drivers don't have to baby this rugged, heavy-duty, multi-lever clutch. And for good reason! There's just *one* spring and 20 equalizing levers. Result: pressure is evenly distributed all over the pressure plate . . . every part touches at the *same instant* with the *same pressure*.

These days, it's more important than ever to keep "down-time" to a minimum. Your service and repair shop will appreciate copies of our new Clutch Service Manual, and a free, large size wall chart detailing clutch adjustment procedure. Write for free copies.

For quick service on genuine Lipe parts, look for this ad in the yellow pages of the telephone directory in principal cities.

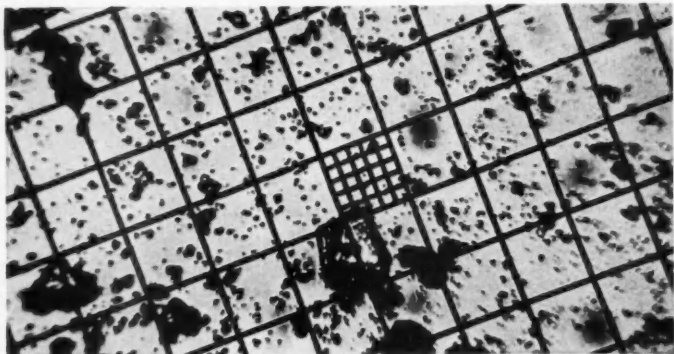


Lipe - ROLLWAY CORPORATION

Manufacturers of Automotive Clutches and Machine Tools
Syracuse 1, N. Y.

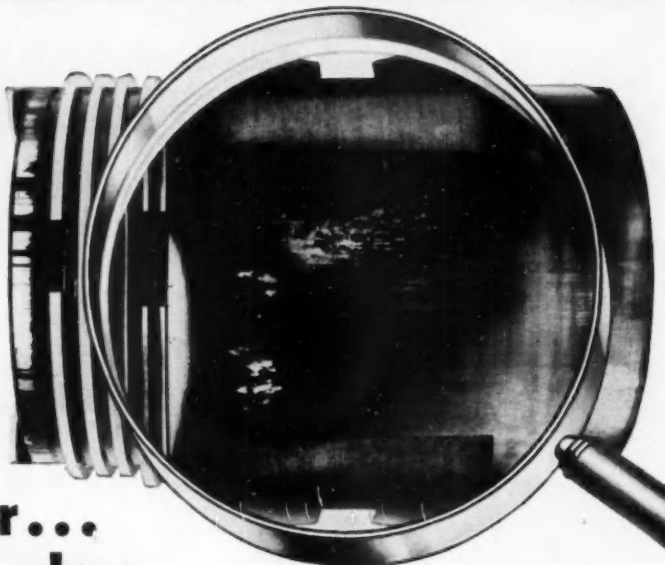
YES!

The Purolator* Micronic Oil Filter with scientifically designed refill traps dirt faster—including abrasives so small they're measured in microns, (.000039")!



NO!

The Purolator Micronic* Oil Filter helps prevent wear like this . . . helps keep bearings and cylinder walls free from scoring action of dirty, abrasive-loaded oil.



Only Purolator . . . and Purolator alone provides this PLUS-Protection

Gives up to 10 times the effective filtering area of ordinary filters.

Traps up to 3 times the abrasive materials caught by other filters tested.

These 2 Important Pluses make the Purolator Micronic Refill the choice of leading car manufacturers. In any engine, it is proof that the maker is proud of his product, wants to assure top performance.

With the car dealer, the Purolator Micronic helps build business and good will . . . Dirt-Check Windows save service time, *sell* the motorist on service.

Whatever your filtering problem—feel free to consult Purolator's engineers.

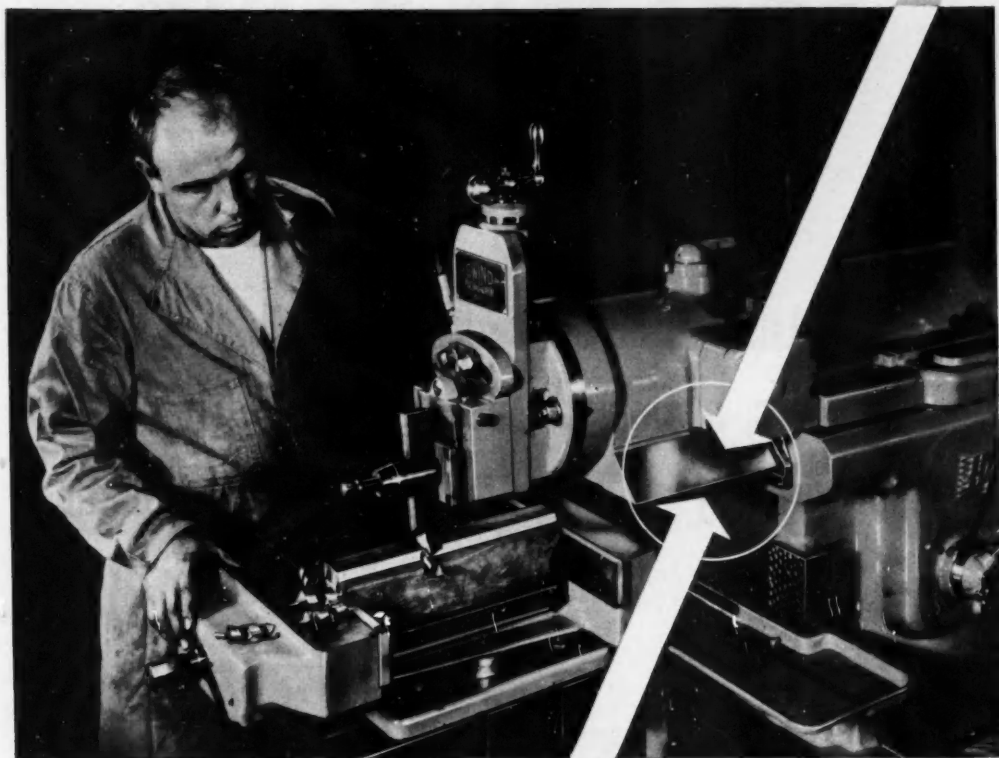
PUROLATOR PRODUCTS, INC.
Rahway, New Jersey and Toronto, Ontario, Canada
Factory branch offices: Chicago, Detroit, Los Angeles

*Reg. U. S. Pat. Off.



ROCKFORD HYDRAULIC SHAPERS

give you long life,
hold original accuracy here



...because ram ways are flame hardened and ground

Rockford Shapers have flame-hardened and ground ram ways to help prevent scoring under heavy cuts and high cutting speeds. Ram bearing gib adjustments are also easier to make, without the danger of galling.

Any of our representatives will be glad to show you how these advantages help you beat production schedules and costs. Phone today for a conference, or write us direct for a definite proposal.

GET ALL THE FACTS
on Rockford Hydraulic
Shapers. Send for
our bulletin No. 201K.



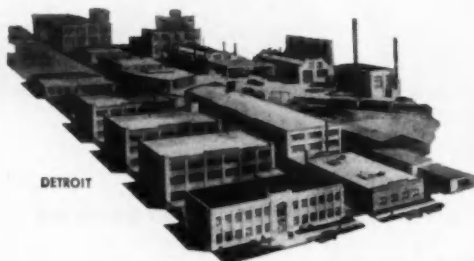
520

ROCKFORD MACHINE TOOL CO.
2500 KISHWAUKEE STREET • ROCKFORD, ILLINOIS

U. S. GOVERNMENT SPECIFICATION FINISHES

Lusterless, semi-gloss and gloss
lacquers, enamels; undercoats and thinners
to meet virtually all U. S. Government Specifications

*WRITE for Booklet listing over 150 Government Specification Finishes for U. S.
Army, Navy, Chemical Corps, Air Force, Ordnance, Joint Army-Navy and Federal.*



Illustrated above are Rinshed-Mason's 37 building units at Detroit and Anaheim, California, consisting of office, factory and laboratory facilities. Not shown are field exposure test facilities at Miami, Florida.



Established in 1919, Rinshed-Mason is one of America's leading manufacturers of fine quality lacquers, enamels and undercoats for automobiles, farm equipment, appliances, and numerous other peacetime industrial products. Beyond this, versatile laboratory and production facilities are available to meet defense requirements for protective and other coatings.

Rinshed-Mason Co.

5935 MILFORD AVE.
DETROIT 10, MICH.



1244 N. LEMON ST.
ANAHEIM, CALIF.



The Crankshaft

—probably the most important single part in the modern high-speed, high-compression, internal-combustion engine.

Wyman-Gordon—specialists in the design and forging of crankshafts since the start of the automotive industry—furnished the first heat-treated crankshaft, forged the first six-throw crankshaft, forged the first eight-throw crankshaft, forged the first crankshaft with integral counterweights. In automotive crankshafts and in all types of aircraft forgings, steel and light alloy, there is no substitute for Wyman-Gordon experience.

Standard of the Industry for More Than Sixty Years

WYMAN-GORDON

FORGINGS OF ALUMINUM • MAGNESIUM • STEEL

WORCESTER, MASSACHUSETTS

HARVEY, ILLINOIS

DETROIT, MICHIGAN

Chrysler

Ford

Studebaker

Kaiser-Frazer

Nash

DODGE

Continental

Mack

DeSoto

FALK

HERCULES

CASE

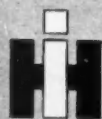
A PRODUCT IS JUDGED
BY THE COMPANIES IT SERVES

We have been a **DEPENDABLE**
manufacturer of engine bearings
for over a quarter-century

**DETROIT ALUMINUM & BRASS
CORPORATION**

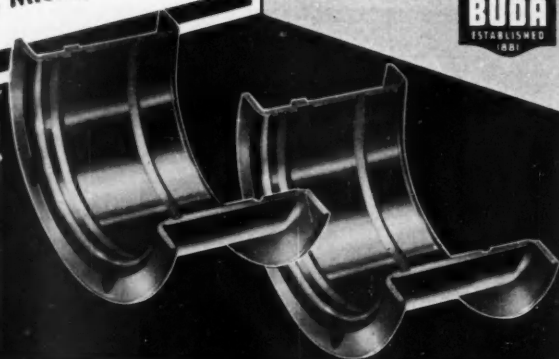
Detroit 11, Michigan

PLYMOUTH
BUILDS GREAT CARS



INTERNATIONAL

BUDA
ESTABLISHED
1881



Need a hand with your Tooling Problem?



See your
Black & Decker
distributor—handling
World's Most Complete Line
of Portable Electric Tools!

Production, maintenance, construction—you name the job and your nearby Black & Decker Distributor has the tool to handle it—faster, better, at lower cost! He gives you a choice of over 100 Black & Decker Electric Tools; powered by famous B&D-built motors for uninterrupted output; streamlined, perfectly balanced for easier handling, less worker fatigue; built with extra-tough parts, huskier housings, quality features throughout; backed by the matchless facilities of 30 B&D Factory Service Branches.

And your B&D Distributor has the know-how and experience to give you helpful suggestions to cut corners, man-hours and costs, whatever your tooling problem. Call him today. Write for free, detailed catalog to: THE BLACK & DECKER MFG. CO., 635 Pennsylvania Ave., Towson 4, Md.

ELECTRIC DRILLS: Capacities from $\frac{1}{8}$ " to $1\frac{1}{4}$ " in steel, double in hardwood. Choice of speed, power, handle and price in most capacities.

ELECTRIC SANDERS: 7" and 9" disc diam., for everything from intermittent service to heavy-duty production. Sand, grind, wire brush, plane.

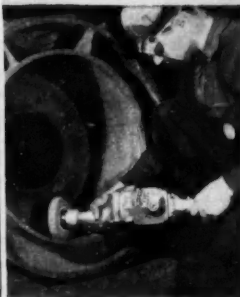
Leading Distributors Everywhere Sell



Black & Decker
PORTABLE ELECTRIC TOOLS



BENCH GRINDERS: 6", 8" and 10" wheel diam., $\frac{1}{2}$ to 1 H.P. Most modern design in the field; adjustable tool rests, "constant speed" motors.



PORTABLE GRINDERS: 3", 4", 5" and 6" wheel diam. Bring the tool to heavy, bulky work for grinding, wire brushing, buffing. Perfectly balanced.



SCREW DRIVERS: For everything from driving tiny screws to 1" diam. nuts and bolts. Positive and adjustable clutches, 90° Angle Head models.

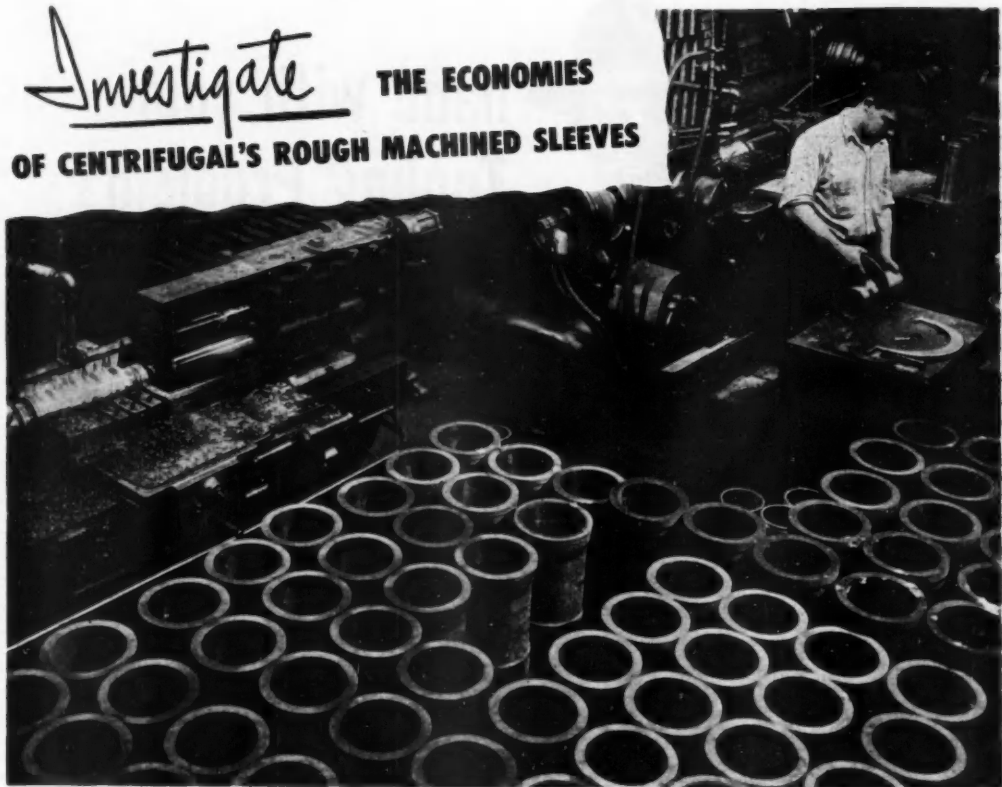


ELECTRIC "QUICK-SAWS": For cutting to max. depth of $2\frac{1}{2}$ ". Ten times faster than hand sawing in construction, repair, crafting, uncrating.

*Trade Mark Reg. U. S. Pat. Off.

Also: ELECTRIC HAMMERS • ELECTRIC WRENCHES • BRUSH BLANDS • TAPPERS • DRILL GRINDERS • POLISHERS
SANDERS • BENCH GRINDERS • INDUSTRIAL VACUUM CLEANERS • VALVE & TOOL GRINDERS • Standards of Dependability

Investigate THE ECONOMIES OF CENTRIFUGAL'S ROUGH MACHINED SLEEVES



Eliminate

- TOOL BREAKAGE
- SCRAP IN YOUR PLANT
- MACHINE TIME LOSS

Centralloy

Now, economize on your production costs . . . gain larger plant capacity . . . and speed up production with Centrifugal's rough machined cylinder sleeves. You eliminate all tool breakage on this operation, you eliminate machine time loss from tool breakage and through the by-passing of rough machining operations, you eliminate scrap. You gain savings in time and money. **YOU GAIN EXTRA PLANT CAPACITY . . . AND SPEED UP PRODUCTION.** Write us for complete details today.

Proven sleeve iron alloys (including type A Graphite) for Diesel, dry sleeves, wet sleeves, for truck, tractor, bus and marine engines. Normal bore range 2½" to 10". Special sizes on request.

CENTRIFUGAL FOUNDRY COMPANY

1367 West Sherman • Muskegon, Michigan

Extra Dependability thru Centrifugally Cast Electric Alloys

Reprints from this or other Logbook pages are available for your files. Request them from our Redwood City, California office

Where the going is really rough, spring-loaded leather grease seals provide rugged dependability

Heavy equipment quite naturally requires ruggedly constructed components throughout. It is not surprising that the grease seals employed in the "Caterpillar" DW-20 Tractor (Fig. 1) are of the most rugged construction and



Figure 1
"Caterpillar" DW-20 Tractor.

are capable of dependable performance under the most gruelling operation.

At the rear bearing position of the clutch assembly (Fig. 3) two National 50,000 series spring-loaded leather grease seals are employed. The seal (A) at the inside position faces the ball bearing and its main function is to prevent grease from entering the clutch. The seal (B), however, is faced away from the bearing and effects a seal on the coupling (not shown) which joins to the splined drive shaft. Facing this rear seal outward permits flush lubrication of this bearing as grease is forced in through the fitting at the top. At the same time this outward-facing seal provides protection against extraneous matter which is encountered under the usual operating conditions of equipment of this kind.

A distinct advantage of the spring-loaded leather oil seal is its rugged construction. Such seals, particularly the 50,000 series National Oil Seal (Fig. 2), are of a heavy construction. This pro-

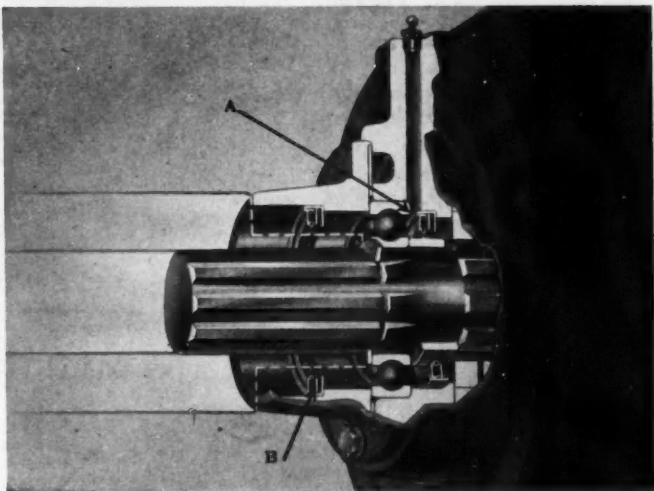


Figure 3
Cut-away drawing of Rear Clutch Bearing.

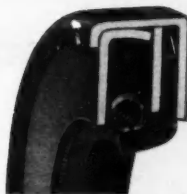


Figure 2
National 50,000 series Leather Grease Seal.

vides a margin of safety against inept replacement techniques in the field.

And, furthermore, because the leather sealing members are able to retain lubricant within themselves, these seals can operate under dry conditions for some time . . . a safety margin against neglect of lubrication.

Single-wipe spring-loaded leather seals are generally available in almost any standard bore or shaft size. For complete information, write direct to factory or get in touch with the nearest National Oil Seal engineer.

"Let Your Decision be Based on Precision"



NATIONAL MOTOR BEARING CO., INC.

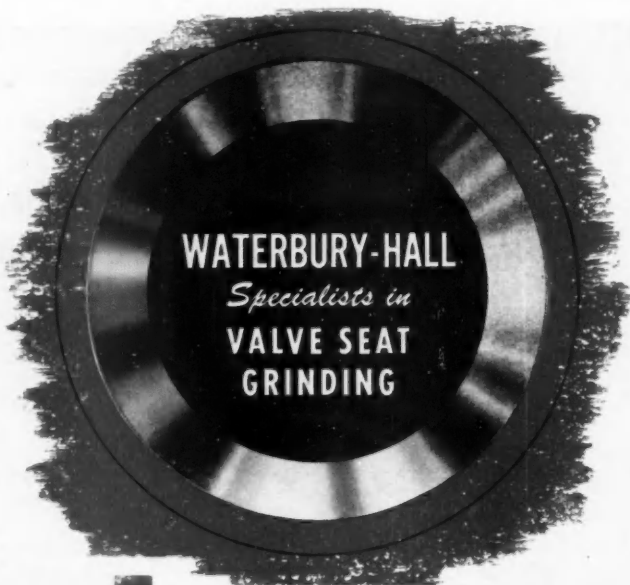
General Offices: Redwood City, California
Plants: Redwood City, Calif.; Downey (Los Angeles County), Calif.; Van Wert, Ohio

2144

CALL IN A NATIONAL ENGINEER FOR RECOMMENDATIONS

BUFFALO, N. Y.	Room 1124, Prudential Bldg., Mohawk 9222	MILWAUKEE, WIS.	647 West Virginia Street, Broadway 1-3234
CHICAGO, ILL.	Room 2014 Field Building, Central 6-8663	NEW YORK CITY, N. Y.	122 East 42nd Street, Lexington 2-8260
CLEVELAND, OHIO	210 Heights Rockefeller Bldg., Yellowstone 2-2720	PHILADELPHIA, PA.	401 North Broad Street, Bell-Walnut 2-6997
DALLAS, TEXAS	30 1/2 Highland Park Village, Justin 8-8453	REDWOOD CITY, CALIF.	Broadway and National, Emerson 6-3861
DETROIT, MICH.	728 Lothrop Avenue, Trinity 1-6363	WEST SPRINGFIELD, MASS.	1025 Elm Street, Springfield 2-1881
DOWNY (Los Angeles Co.), CALIF.	11634 Patten Rd., Topas 2-8166	SYRACUSE, N. Y.	P.O. Box 1224, Baldwinsville 662
WICHITA, KANSAS	519 South Broadway, Wichita 2-6971		

- **BETTER VALVE SEATS**— faster in service shops as in factories with **WATERBURY-HALL** grinders.
 - **COMPLETE EQUIPMENT LINE**, for valve servicing by **FACTORY** methods.
 - For Valve Seat Grinders, Valve Refacers, Valve Seat Inserters, Cylinder Hones —
- ASK YOUR JOBBER FOR WATERBURY-HALL**



CAR & TRUCK ENGINE PRODUCTION

The nation's leading automobile and truck producers precision grind all valve seats automatically, in as little as 60 seconds, block to block, on **WATERBURY-HALL** vertical or "V" type Multiple Spindle Grinders.

AIRCRAFT ENGINES

For production or service, **WATERBURY-HALL** Wet Type Valve Seat Grinders effectively overcome common problems presented by physical properties of current seat materials and by the frequent inaccessibility of seats themselves.

DIESEL POWER

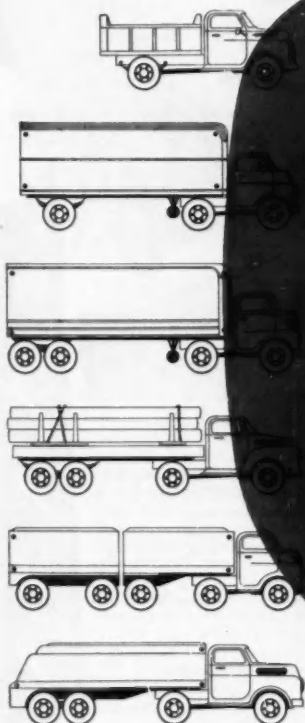
The **WATERBURY-HALL** Diesel Valve Seat Grinder is specifically designed to give, without jamming, the perfect seats necessary for high compression engines — in either production or service.

WATERBURY TOOL DIVISION

VICKERS INCORPORATED
A SUBSIDIARY OF THE SPERRY CORPORATION

162 AURORA ST., WATERBURY 20, CONN.

GUNITE WHEELS MAKE GOOD TRUCKS BETTER



GUNITE CAST-STEEL WHEELS
*Offer Both Price and Weight
Advantages to Heavy Truck
and Trailer Manufacturers*

ESTABLISHED
IN 1924

ROCKFORD
ILLINOIS

Many engineers are specifying Gunite Cast-Steel Wheel Assemblies on their heavier trucks and trailers. They gain all these advantages:

1. Minimum weight with maximum strength
2. Better appearance
3. Floating rim bolt for easy replacement
4. Increased safety of famous Gunite Brake Drum
5. Greater air-cooling over brake drums
6. Easier Assembly... less weight to handle

Write for Complete Engineering Data

GUNITE FOUNDRIES CORPORATION

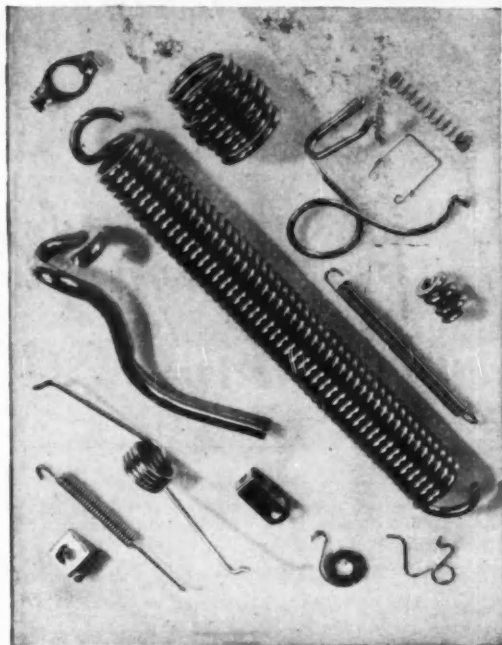


Coil Spring says:

"A LITTLE Spring Can Make a BIG Difference"

● When a spring is doing its job efficiently, dependably, there's little cause for worry. That's the kind of a spring we can make for you. U. S. Steel Wire Spring craftsmen turn out springs and small parts that are engineered to give your product a long record of trouble-free service. You can eliminate spring worries today with a call or letter!

**Producing Clutch Pressure Springs
... Clutch Dampener Plate Springs**



The U. S. STEEL WIRE SPRING Co.

7800 FINNEY AVE. • MICHIGAN 1-6318

CLEVELAND 5, OHIO

**Set Screws STAY SET
on REO Power Mowers**

...since changing to

ZIP-GRIP[®]
Self-Locking
SET SCREWS



REO
USES
not 1
not 2
but 5
ZIP-GRIPS[®]
ON EACH
MOWER

SEND FOR THIS

**FREE
ZIP-GRIP[®]**

**Action
Demonstrator**
...and see why—



ZIP-GRIPS[®] defy vibration, jolts, shocks ... "Do Not Loosen in Normal Service" says Reo Motors, Inc., makers of "America's Biggest Selling Power Mowers".

ZIP-GRIP[®] locks vibration and locks securely, without the use of lock nuts, wires, deformed or riveted threads and has no damaging effect on the tap hole or shaft. Proven on over 100 products.

The demonstrator shows you how ZIP-GRIP's[®] exclusive Contra-Thrust action, together with Interference Fit, provides this positive self-locking effect.

ZIP-GRIP[®] is available in all materials, and all popular or special sizes.

Along with your ZIP-GRIP[®] Action Demonstrator we will send you, without cost, an illustrated Data Sheet and an offer of Engineering Test Samples to help solve puzzling set screw applications on your products. Write today for all these, without charge or obligation of any kind.

OPAT. PEND.

5625

Makers of
Set Screw & Mfg. Co.
SET SCREWS

16 Main St. Bartlett, Ill. (Chicago suburb)

We Specialize in Solving Puzzling Set Screw Problems

FOR FREE ZIP-GRIP[®] DEMONSTRATOR

*Write Your Name and Address in Margin
below, tear out and mail to us today!*

*Can you match
these production
figures?*

THIS
Version
KNUCKLE JOINT
PRESS
forms
260
flywheels
per hour



In the plant of a leading automobile manufacturer, the 2000 ton Verson Knuckle Joint Press illustrated stamps out automatic drive flywheels at the rate of 260 per hour. A flat blank is transformed into a flywheel ready for machining in a single operation in less than 14 seconds!

The acceptance of press forming of precision parts under tremendous force is growing rapidly. By using the knuckle joint's characteristic of applying high pressure over a con-

centrated area it is often possible to produce superior quality parts at a substantially higher rate and at a fraction of the cost of conventional methods.

Verson Knuckle Joint Presses meet all requirements for work of this type. Their rugged, all steel construction in combination with Verson design gives them the accuracy, power, speed and dependability so vital to this type of service. Write for complete details outlining the nature of your problem.

Originators and Pioneers of Allsteel Stamping Press Construction

VERSION ALLSTEEL PRESS COMPANY

9307 South Kenwood Avenue, Chicago 19, Illinois

So. Lamar at Ledbetter Dr., Dallas 15, Texas

A VERSION PRESS FOR EVERY JOB FROM 60 TONS UP

MECHANICAL AND HYDRAULIC PRESSES AND PRESS BRAKES • TRANSMAT PRESSES • TOOLING
DIE CUSHIONS • COMPRESSION AND TRANSFER MOLDING PRESSES

MARKEM



marks them all



FROM ARTILLERY SHELLS
TO MEDICAL AMPULES

MASTERS OF MARKING — Since 1911

Markem methods, machines, type and inks have been marking the products of industry for forty years. Markem machines can mark up to many thousands of pieces per hour. They make clear, durable imprints on flat, curved or irregular surfaces of paint, paper, wood, glass, metal, leather, plastic, rubber, fabric, composition and pressure sensitive tapes. No special skill is needed for their operation. Legend and color of imprint may be quickly and easily changed.

MAKE YOUR MARK WITH MARKEM

When your products need marking for Identification, Control or Market — ask Markem. Submit your problem, together with a sample of the item to be marked. Markem Machine Company, Keene 8, New Hampshire.



ELCO

Screws

ARE GOOD SCREWS

WOOD SCREWS

LAG SCREWS

MACHINE SCREWS

SPECIAL SCREWS

MACHINE SCREW NUTS

TAPPING SCREWS

DRIVE SCREWS

STOVE BOLTS

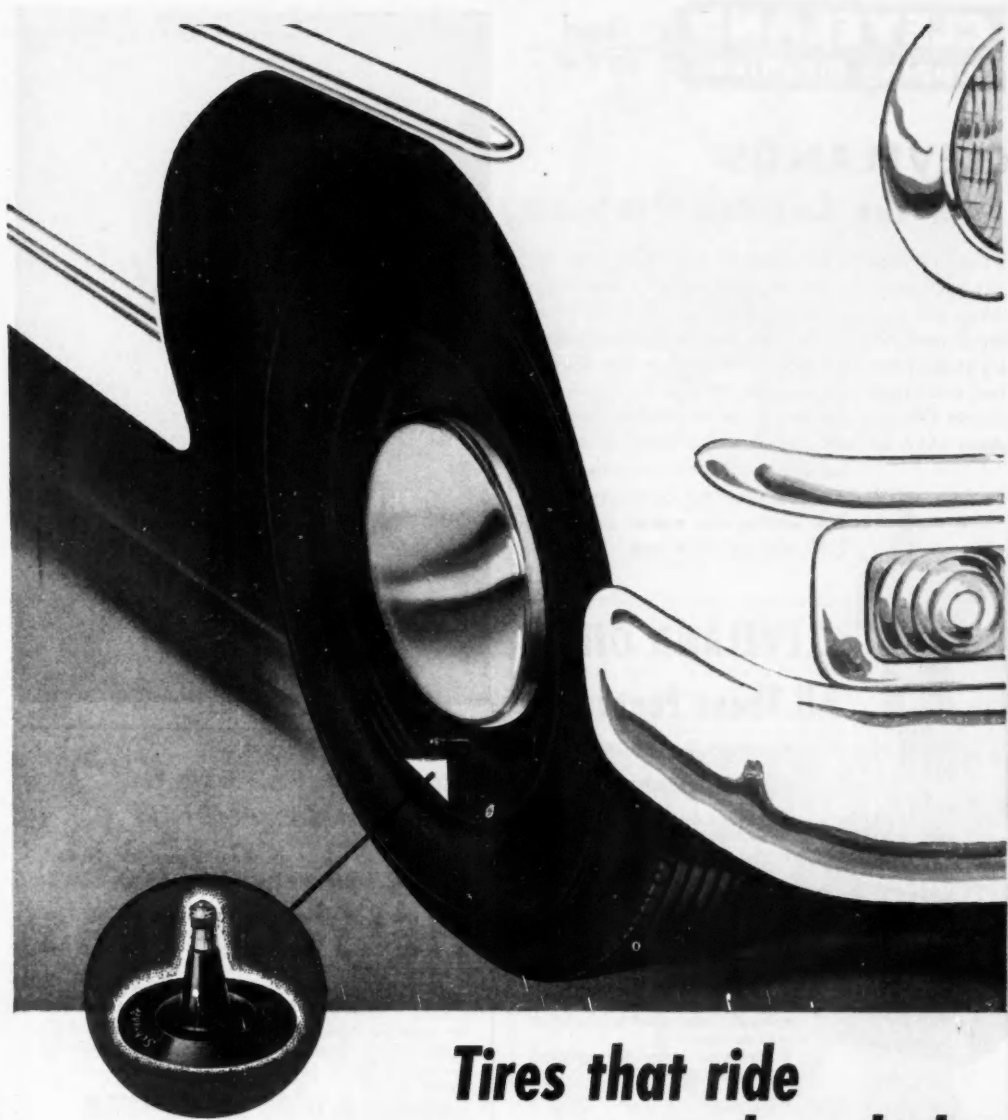
CAP SCREWS

PIPE PLUGS

THREAD CUTTING SCREWS

PHILLIPS AND SEMS SCREWS

ELCO TOOL AND SCREW CORPORATION
1914 BROADWAY • ROCKFORD, ILL.



Schrader supplies the kind of tire valves that do a positive air-sealing job and provide many extra qualities that result in added miles of greater safety, ease of steering and riding comfort.

A. SCHRADER'S SON, BROOKLYN 17, N. Y.
Division of Scovill Manufacturing Company, Incorporated

Schrader
REG. U. S. PAT. OFF.

Tires that ride to work and play

Load the family in the car. Head for the beach, the country, or town or church . . . with never a fear about the tires. They're built to give protection for many miles of easy, economical driving. A key to dependable tire performance is the valve that *locks* the air in the tire.

FIRST NAME IN TIRE VALVES

FOR ORIGINAL EQUIPMENT AND REPLACEMENT

CLEVELAND tapping machines

lead
screw

CLEVELANDS in the Defense Program

Watch a Cleveland Tapping Machine in action for a few minutes . . . tapping two 20 mm. shells every 6.1 seconds . . . turning out 3.5 rocket bodies at the rate of 100 pieces per hour . . . and you get the idea that the front line of democracy is a lot closer than you think. *We cannot afford to waste a man hour which could be more effectively spent for defense production.* Cleveland engineers design and build ingenious machines which not only combine several operations but also tap groups of holes at one stroke of the machine. *Cleveland Tappers save valuable working time and cut production costs.* Find out about them.

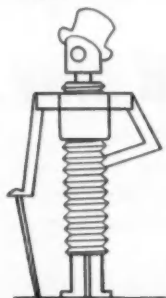


CLEVELAND Offers All These Features

- Precision hardened and ground lead screw.
- Fully automatic or manual control.
- Precision depth control for blind hole tapping.
- Heat treated alloy steel spindles for maximum strength.
- Easily changed spindle speeds.
- Exclusive super sensitive clutch reduces breakage and increases tap life.
- Positive coolant and lubricant supply under constant control of operator.
- Rigidly constructed to give years of service.
- Maximum safety for operator and machine.

Mr. Lead Screw says . . .

The lead screw feed principle as designed and pioneered by Cleveland is now generally accepted as the key to precision tapping at high speeds. Write today for your copy of the Cleveland Production Tapping Guide and Catalog AT-5



THE CLEVELAND TAPPING MACHINE CO.
A Subsidiary of AUTOMATIC STEEL PRODUCTS, INC.
CANTON 6, OHIO



Quantity PRODUCTION of GREY IRON CASTINGS

ONE OF THE NATION'S
LARGEST AND MOST MODERN
PRODUCTION FOUNDRIES

ESTABLISHED 1865

THE WHELAND COMPANY
FOUNDRY DIVISION

MAIN OFFICE AND MANUFACTURING PLANTS
CHATTANOOGA 2, TENNESSEE

Is Interesting Work Important to You ? Do You Want a Promising Future ?

Then let us tell you about America's Newest,
Youngest, most promising industry:

HELICOPTERS

There are a few excellent opportunities open with a pioneer helicopter company. We want the best for a long-range program. A program that looks to the future. Space limitation does not permit full particulars but if you are an

AERONAUTICAL } **ENGINEER**
or MECHANICAL } **or DESIGNER**

who wants to see where he is going we would like to tell you of the excellent opportunities in America's newest industry. Submit qualifications and experience to

MGR. ENGINEERING PERSONNEL
HELICOPTER DIVISION
BELL AIRCRAFT CORPORATION
P. O. BOX 1 BUFFALO 5, N. Y.

Col-O-Vin is a Columbus Coated Fabric—member of a family of products that has long served the automobile industry. Col-O-Vin vinyl coated fabrics come to you with a background experience of quality and styling that is contributing importantly to today's luxurious car interiors.

When cars
looked like this . . .

"Columbus" was making Coated Fabrics



COL-O-VIN—vinyl coated fabrics
COL-O-TEX—pyroxylin coated fabrics

Quality fabrics for

Upholstery • Headlinings • Door Panels
Welting • Carpet Bindings • General Trim

Col-O-Vin is supplied in volume to motor car and seat cover manufacturers

COLUMBUS COATED FABRICS CORPORATION • Dept. AH-91, Columbus 16, Ohio
Detroit • New York • Chicago • San Francisco • Los Angeles



If you have a difficult trim problem, let our technicians and stylists cooperate with you to find the right answer—the precise color, design or texture for your special needs. Phone Jim Handley and talk it over.

call **Trinity 4-1660** Jim Handley, factory representative, 816 Fisher Bldg., Detroit

Fast-Flo

TRANSFER PUMP

HANDLES HUNDREDS OF FLUIDS AND SEMI-FLUIDS

WORKS DOZENS OF WAYS!

• Handiest piece of equipment in the plant! That's the verdict at scores of plants which use Graco's Fast-Flo Transfer Pumps.

Fast-Flo is a really versatile worker... has dozens of different specific uses. Here are just a few ways it will work for you:

- For transferring fluids from original drum to smaller vessels.
- For transferring from open tanks to smaller vessels.
- For transferring fluids to an overhead tank.
- For supplying multiple outlets above or below pump.
- For supplying hose reel which reaches several mixing vats or other vessels.

Fast-Flo is low in cost... easy to handle... a rugged worker. Provides double-action, high volume delivery. Air-operated. Write today for free literature!

GRACO COMPANY, INC.
93 GRACO SQUARE
MINNEAPOLIS, MINNESOTA



GRACO

Fast-Flo
TRANSFER PUMP

District Offices in NEW YORK, PHILADELPHIA, CHICAGO, DETROIT, SAN FRANCISCO

SPECIAL DUTY SAFETY LIGHTS by JUSTRITE!

J
U
S
T
R
I
T
E

**SAFETY EXTENSION
LIGHT**



Model 1727-S

Three cell operation. Flexible extension light. Retains curvature as you set it. Non-breakable clear plastic globe. Shock proof and spark proof. Choice of 15" or 30" extensions for inspection of all inaccessible areas.

FOUR CELL SAFETY HEADLIGHT

Cass clips to belt and is connected to rubber padded headband with 48" plastic weatherproof cord. 1,500 foot beam. Underwriters Lab. approved for Class 1, Group D hazardous locations.

Model 1904-S

ORDER FROM YOUR JOBBER

JUSTRITE

MANUFACTURING CO.

FREE CATALOG
Write Dept. AI

2001 N. Southport Ave.
CHICAGO 16, ILL.

new Tray-Type AIR CLEANER

removes and holds more dirt!



RECOMMENDED FOR HIGH-CAPACITY ENGINES on large tractors, rock crushers, power shovels, etc. Large dirt-holding capacity allows longer interval between servicing.



REMOVABLE TRAY SIMPLIFIES SERVICING. Entire tray is quickly removed for cleaning. Multiple screens prevent clogging of condensing element.

IN THIS NEW Donaldson heavy-duty cleaner, the removable multi-screen "tray" and revised oil cup design feeds more of the condensed oil back into the air stream adjacent to the center tube.

A balanced distribution of oil across the entire lower element has been achieved, eliminating both overloaded and "thin" areas. Extensive tests in the field over a period of five years prove conclusively that the new cleaner has a higher efficiency and a greater dirt-holding capacity. We invite manufacturers to write or call for design data and test reports.

DONALDSON CO., INC. 666 Pelham Blvd., St. Paul 4, Minnesota
Donaldson Co. Ltd. (Can.), Chatham, Ont.

Donaldson AIR CLEANERS

For 50 Years MOLINE "HOLE-HOG" MACHINE TOOLS

HAVE SERVED AMERICAN INDUSTRY

1901 - 1951

DRILLING - BORING - HONING - TAPPING
and SPECIAL MACHINES

MOLINE TOOL COMPANY

102 20th St. MOLINE, ILLINOIS

JUTE AND COTTON FELT for

INSULATION- COMBINATION SEATS

Your Quality Manufacturer

Since 1878

the **CHAS. A. MAISH CO.**
FRANKLIN, OHIO

PRECISION

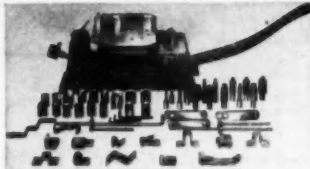
Springs • Wireforms

COMPRESSION • EXTENSION • TORSION • FLAT

Accurate Spring Mfg. Co.

3810 W. Lake Street

Chicago 24, Illinois



RICHARDS

MULTIFORM

BENDER-CUTTER

4-IN-ONE

Angle Bending

Circle Bending

Cutting, Peeling

Kalamazoo 60F, Mich.

PIPE PLUGS Exclusively

Steel • Cast Iron

Malleable Iron



MACHINE PRODUCTS CO.

INC.

Pittsburgh 15, Pa.

Evans City, Pa.



Fellows

MACHINES AND TOOLS FOR
GEAR PRODUCTION

The Fellows Gear Shaper Company, Springfield, Vt.



RAILS New and Relaying!

TRACK MATERIALS
AND ACCESSORIES CARRIED IN STOCK
Switch Material • Spikes and Bolts • Track
Tools • Ties • Tie Plates • Burners •
Complete Side Tracks

BUILDERS STEEL SUPPLY CO.
4201 WYOMING - P.O. BOX 186 - DEARBORN, MICH.



Heavy, medium and light stampings in any quantity.

A steady flow of production . . . when you want it.

WORCESTER STAMPED METAL CO., 9 HUNT STREET, WORCESTER, MASS.

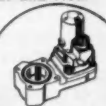
Classified Advertisement

MECHANICAL ENGINEER—Progressive twelve-year-old company (250 employees) has opening for first rate engineer in product engineering department (16 employees in product engineering). Work consists of research, development, design and application of specialty accessories for freight cars and tractors. Permanent position; salary commensurate with ability, \$6,500 to \$10,000; employee insurance and profit-sharing plan. State qualifications and salary expected. Correspondence held in strict confidence. Address Paul K. Beemer, Vice President, Preco Incorporated, 6300 East Slauson Avenue, Los Angeles 22, California.

hi-g* for better AUTOMATIC CONTROL

of Temperature-Pressure Level and Flow

* "hi-g" indicates positive operation in any position regardless of vibration, change of motion or acceleration.



AV-16—Gate type Motor Valve



AL-586—Pressure Switch



AV-14—Electro Hydraulic Four-Way Valve

On famous aircraft of today and tomorrow, whether they be military or commercial, you're sure to find General Controls on the job. General Controls' Design Specialists will welcome inquiries from Design Engineers.



GENERAL CONTROLS

891 Allen Avenue • Glendale 1, Calif.
Manufacturers of Automatic Pressure, Temperature, Level and Flow Controls
FACTORY BRANCHES: Baltimore 2, Birmingham 2, Boston 16, Buffalo 3, Chicago 5, Cleveland 15, Columbus 13, Dallas 2, Denver 4, Detroit 31, El Paso, Glendale 1, Houston 4, Indianapolis 4, Kansas City 3, Milwaukee 3, Minneapolis 2, Newark 6, New Orleans, New York 17, Omaha 2, Philadelphia 23, Pittsburgh 27, Salt Lake City 4, St. Louis 3, San Francisco 7, Seattle 1, Tulsa 6, Washington 6, D.C. DISTRIBUTORS IN PRINCIPAL CITIES

In 65 years of research and engineering achievements Robert Bosch GmbH has contributed essentially to the growth of the automotive industry. Today the vast manufacturing program of Robert Bosch GmbH, Stuttgart, Germany, comprises the following products:

BOSCH
ignition units, spark plugs, generators, starters
BOSCH
batteries, headlamps, horns, blenders, car heaters

BOSCH
Diesel fuel injection equipment, air pressure brakes
BOSCH
lubricating pumps, electric tools condensers, etc.



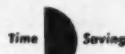
ROBERT BOSCH GMBH
Export Division
STUTTGART, GERMANY



THE NEW, IMPROVED **NON-SHRINK** CASTING RESIN



Dimensional Accuracy



Less Skilled Manpower



For Master Molds—Foundry Patterns
—Duplicating Patterns—Form Dies—
Check Fixtures

A material of interest to the engineer who

1. Desires to produce models or tools quickly and economically—
2. With a minimum of highly skilled labor—
3. Without elaborate or expensive equipment.

IMPORTANT NOTICE

Rezolin "8000" Tool-Plastic can now be hardened without heat in a matter of hours by the use of the new and exclusive Rezolin Quick-Set Accelerator additive (liquid type).

(*Pat. App. For)

Rezolin, inc.

Serving Industry Since 1938

4825-27 W. Jefferson Blvd., Los Angeles 16, Calif.

Write today for new catalog AI-9



PRESSES

Straight Side—Double Crank
All-Welded Steel Construction

CAPACITIES 50 to 400 tons
LENGTHS 4 to 16 feet



DREIS & KRUMP
MANUFACTURING COMPANY

7420 S. Loomis Blvd., Chicago 36, Ill.



Insist on VELLUMOID!

GENUINE VELLUMOID PAYS!

The Genuine Brand means Genuine Quality. You can rely on VELLUMOID gaskets and packing.



The Advertisers' Index is published of the advertising contract. Every rectly. No allowance will be made

AUTOMOTIVE INDUSTRIES, September 15, 1951

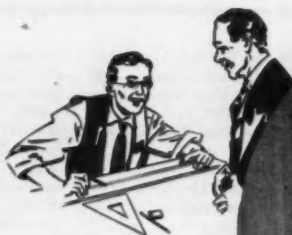
Advertisers

as a convenience, and not as part
care will be taken to index cor-
for errors or failure to insert.

Johnson Bronze Co.....	—
Johnson Products, Inc.....	138
Jones Motrola Corp.....	—
Justrite Mfg. Co.....	197
Kelsey-Hayes Wheel Co.....	127
Kennedy Car Liner & Bag Co., Inc.....	70
Kent-Owens Machine Co.....	71
Kester Solder Co.....	—
King-Seely Corporation.....	180
Kold Hold Mfg. Co.....	126
Kropp Forge Company.....	—
Lake Erie Engineering Corp.....	—
Lamb Electric Company.....	115
Layne & Bowler, Inc.....	—
Leece-Neville Co., The.....	—
Leeds & Northrup Co.....	28
Leland, Inc., G. H.....	—
Le Roi Company.....	178
Link-Belt Company.....	85
Lipe-Rollway Corp.....	181
Littelfuse, Inc.....	—
Littell Machine Co., F. J.....	—
Loewy Construction Co., Inc.....	—
Long Manufacturing Div.....	111
Lord Manufacturing Company	94
McKay Machine Co.....	155
Machine Products Co., Inc.....	198
Magnaflux Corp.....	160
Magnecord, Inc.....	158
Mahon Co., The R. C.....	—
Maish Co., Chas. A.....	198
Mallory & Co., Inc., P. R.....	145
Markem Machine Company.....	194
Marman Products Co., Inc.....	64
Mattison Machine Works.....	2
Mechanics Universal Joint Div.....	174
Michigan Tool Company.....	—
Micromatic Hone Corp.....	—
Midland Steel Products Co.....	172
Miller Motor Co.....	8
Milsec Manufacturing Co.....	—
Minneapolis-Honeywell Regu- lator Co.....	142
Minnesota Mining & Mfg. Co.....	—
Moline Tool Co.....	198
Monarch Machine Tool Co.....	157
Moraine Products Div.....	—
Morse Chain Co.....	170
Motch & Merryweather Ma- chinery Company, The.....	173
Muskegon Piston Ring Co.....	77
N-A-X Division.....	69
Nadella.....	—
Nash Bros. Company.....	—
National Acme Co., The.....	83
National Broach & Machine Co.....	135
National Machinery Co.....	—
National Metal Exposition.....	164

National Motor Bearing Co....	189
National Steel Corporation....	69
New Britain Machine Co.....	—
New Departure Div.....	24
Niagara Mach. & Tool Wks.....	128-129
Oakite Products, Inc.....	—
Ohio Seamless Tube Co., The..	143
Osborn Manufacturing Co.....	176
Page Steel & Wire Div., Amer. Chain & Cable Co., Inc.....	156
Palnut Company, The.....	—
Pangborn Corp.....	—
Parker Rust Proof Co.....	—
Perfect Circle Corp.....	—
Perma Products Co.....	—
Pesco Products Div., Borg- Warner Corp.....	166
Pheoll Manufacturing Co.....	152
Phillips Mfg. Co.....	150
Physicists Research Co.....	—
Pierce Governor Co., Inc., The	74
Pines Engineering Co., Inc.....	179
Plaskon Div.....	—
Plastic Research Products.....	—
Polyken Industrial Tape.....	—
Potter & Johnston Co.....	—
Pratt & Whitney Div., Niles- Bement-Pond Company.....	182
Purolator Products, Inc.....	182
Ramsey Corporation.....	90-91
Rathborne, Hair & Ridgway Box Co.....	130
Raybestos-Manhattan, Inc. (Equipment Sales Div.).....	106-107
Redmond Company, Inc.....	—
Reeve Electronics, Inc.....	134
Remont Mfg. Co.....	108
Revere Copper & Brass, Inc.....	99
Reynolds Metals Co.....	—
Reynolds Wire Div.....	103
Rezolin, Inc.....	199
Richards Co., J. A.....	198
Rigidized Metals Corp.....	—
Rinshed-Mason Company.....	184
Rockford Clutch Div.....	67
Rockford Machine Tool Co.....	183
Ross Gear & Tool Co.....	9
Rubatex Div., Great American Industries, Inc.....	120
Ryerson & Son, Inc., Joseph T.	16
SKF Industries, Inc.....	—
Saginaw Steering Gear Div.....	—
Schmeig Industries Inc.....	84
Schrader's Son, A.....	195
Schwitzer-Cummins Co.....	—
Sealed Power Corporation.....	55
Seneca Falls Machine Co.....	—
Service Spring Co.....	198
Set Screw & Mfg. Co.....	192
Shakeproof, Inc.....	—
Sheffield Corp.....	—
Shuler Axle Co., Inc.....	—
Simonds Abrasive Co.....	148
Spicer Mfg. Div. Dana Corp.....	—
Stalwart Rubber Co., The.....	—
Standard Oil Co. (Ind.).....	—
Standard Pressed Steel Co.....	—
Standard Products Co., The... 125	
Standard Tube Company.....	—
Sterling Aluminum Products, Inc.....	—
Stewart-Warner Corp.....	153
Strom Steel Ball Co.....	—
Stuart Oil Co., Ltd., D. A.....	136
Sturtevant Co., P. A.....	—
Subscription Post-Card.....	194
Sun Electric Corp.....	139
Sun Oil Company.....	133
Sundstrand Machine Tool Co.....	—
Superior Steel Corp.....	65
Surface Combustion Corp.....	—
Synchro-Start Products, Inc...	59
Tennessee Coal, Iron & R. R. Co.....	122-123
Texas Company, The.....	—
Thompson-Bremer & Co. 3rd Cover	—
Thompson Products, Inc.....	117
Timken Roller Bearing Co., The.....	Back Cover
Tinnerman Products, Inc.....	—
Tomkins-Johnson Company, The.....	144
Torrington Co., The.....	51
Tourek Mfg. Co., J. J.....	3
Towmotor Corp.....	—
Tung-Sol Lamp Works, Inc....	92
Tuthill Pump Co.....	162
Tuthill Spring Co.....	—
Twinn Disc Clutch Co.....	140
U. S. Steel Corp.....	122-123
United Engine & Machine Co.....	—
United Specialties Company... 156	
United States Rubber Co.....	—
United States Steel Wire Spring Co.....	192
Universal Products Co., Inc...	—
Vanadium Corp. of Amer.....	61
Vellumold Co., The.....	199
Verson Allsteel Press Co.....	193
Vickers, Incorporated.....	105
Victor Mfg. & Gasket Co. ...	31
Vulcan Rubber Products, Inc.	86
Wagner Electric Corp.....	30
Waldes-Kohinoor, Inc.....	—
Waterbury Tool Div.....	190
Waukesha Motor Company... 1	
Wean Equipment Corp.....	13
Webb Co., Jervis B.....	—
Wellman Bronze & Aluminum Co., The.....	—
Western Felt Works.....	10
Westinghouse Electric Corp.....	—
Wheland Company, The.....	196
Williams & Co., J. H.....	—
Wisconsin Motor Corp.....	—
Wittek Mfg. Co.....	—
Worcester Stamped Metal Co.	198
Wrought Washer Mfg. Co....	162
Wyman-Gordon.....	185
Yale & Towne Mfg. Co., The..	57
Yates-American Machine Co...	154
Young Radiator Company.....	—
Zollner Machine Works.....	202

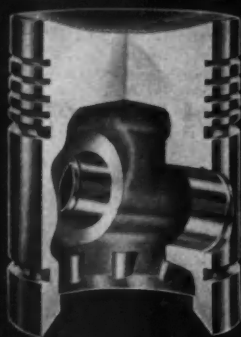
**ENGINEERING
COOPERATION
PRODUCTION
"KNOW-HOW"**



PISTONS

**EXPERTLY DESIGNED
PRECISION-MADE
Specifically for Your
DIESEL
ENGINE**

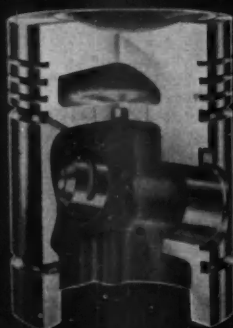
**ORIGINAL EQUIPMENT IN
AMERICA'S FINEST MOTORS -**



CONDUCTION COOLED



SERRATED FINISH



PRESSURE OIL COOLED

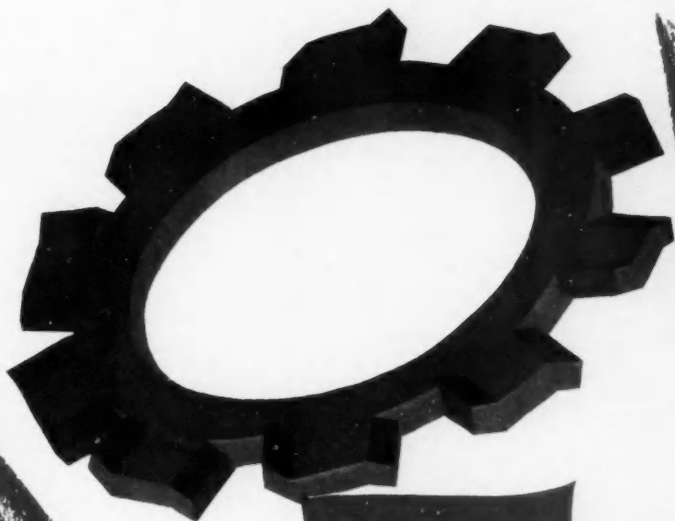
**WAUKESHA
HERCULES
ENGINES
FWD
TWIN COACH
IHC
HALL-SCOTT
BUDA
CUMMINS
MARMON-
HERRINGTON
GMC MACK
CORBITT
DIAMOND-T
REO
CONTINENTAL
SEAGRAVE
FEDERAL**

ZOLLNER

**PISTON EQUIPMENT *for* INTERNAL COMBUSTION ENGINES
— BOTH GASOLINE AND DIESEL
ZOLLNER MACHINE WORKS**

FORT WAYNE, INDIANA

"Makes Any Engine a Better Engine"



Standard
Internal Everlock



Standard
80° Countersunk
Everlock



Standard
Internal-External
Everlock

QUALITY

for

QUALITY

IN YOUR

PRODUCT

**Their chisel edges lock
2 ways against vibration,
temperature changes, strain...**

Chains are still no stronger than their weakest link and there's a chain of quality that runs through your purchasing and specification of component parts. Your product can have no higher degree of quality than the lock washers which hold it together. Then standardize on "Everlock" Washers. The full length of each edge in their patented design *digs in*—into both the nut and the face of the work. They hold for keeps!

There's an "Everlock" for Every Lock Washer Need

Four standard types are shown here but if special needs demand others, let Everlock be first to tell you how your most exacting specifications can be met.

When ordering screw-washer assemblers from screw manufacturers specify Everlock Washers for quality and fast service.

**Ask for the 1951 Catalog. Contains full specifications.
Free on request.**

Everlock

"CHISEL EDGE" LOCK WASHERS

THOMPSON-BREMER & COMPANY, 1642 W. HUBBARD ST., CHICAGO 22, ILL.
In Detroit: Sam T. Keller Company, 2457 Woodward Ave.

The sale that starts when the car is sold

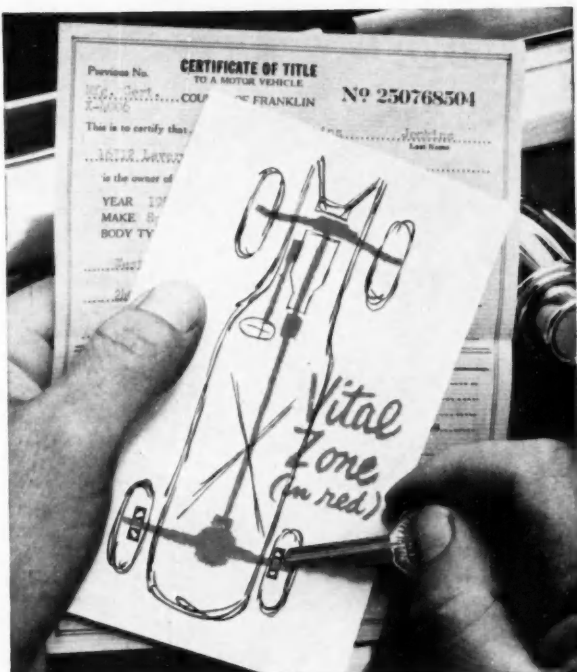
THE most vital part of any sale is *keeping* the customer sold. And that takes *value*.

The longer the nation's cars must be kept in service, the more important value becomes. Especially at the point where value counts most—in the moving parts, the "vital zone".

To make sure of top value in the "vital zone" parts you buy (rear wheel bearings, for instance), keep this formula in mind:

$$\text{Value} = \frac{\text{quality} + \text{service} + \text{public acceptance}}{\text{price}}$$

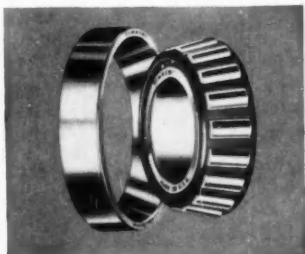
It shows that buying parts on the basis of price alone can be expensive. That a big advantage *above* the line far outweighs a small advantage *below* it. With Timken® bearings, you get the highest quality, the most service, the greatest public acceptance—the best value. In terms of value features, Timken bearing prices are lowest today. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".



How **TIMKEN®** bearings give you value where it counts most . . . in the "vital zone":



SURFACE FINISH IS MEASURED to one millionth of an inch on the profilograph above. Originally developed by the Timken Company, the profilograph helps make possible the precision production of Timken bearings. The Timken Company sets the standards for quality that other bearing makers try to follow.



PINIONS PROVE IT! Timken bearing value is shown again and again throughout the "vital zone". One example: the pinion, toughest bearing application on a car, where all but two makes of autos use Timken tapered roller bearings. Other important applications: wheels, steering gear, transmission, differential.

ONLY TIMKEN BEARINGS GIVE YOU ALL THESE VALUE FEATURES

QUALITY

1. Design leadership
2. Steel made in our own mill
3. Precision manufacture
4. Rigid quality control
5. More than 50 years' experience

SERVICE

6. Unequalled engineering service
7. Unequalled research and development facilities for your use
8. Installation service in the field
9. Widest range of sizes
10. Most dependable source of supply

PUBLIC ACCEPTANCE

11. First choice throughout industry
12. Best-known name in bearings
13. Widespread advertising

it's **TIMKEN** for **VALUE**
TAPERED ROLLER BEARINGS

NOT JUST A BALL ○ NOT JUST A ROLLER □ THE TIMKEN TAPERED ROLLER □ BEARING TAKES RADIAL ○ AND THRUST → LOADS OR ANY COMBINATION ↗